Bringing ideas to life

ANNA
TRANSMISSION PROJECT

ANNA TRANSACTION ADVISORY SERVICES

Environmental and Social Impact Assessment (ESIA)

Angola

Volume I – Non-Technical Summary

March 2020

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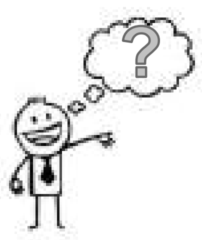
ANGOLA-NAMIBIA (ANNA) TRANSMISSION INTERCONNECTOR PROJECT



How can I participate, ask questions and give my opinion?

Submit the registration and comment form to the Provincial, Municipal or Communal Administration, or send it to the following entities:

To comment on the ESIA documents (current project phase), contact the below:	
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Details of contacts for future phases of the Project:	
	Community Liaison Officer (CLO) (construction and operation)
	Contractor: local office in project area (construction)
	RNT local office branches (operation)

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NON-TECHNICAL SUMMARY (NTS)

This document is the Non-Technical Summary (NTS) of the Environmental and Social Impact Assessment (ESIA) [1] Report for the Angolan portion of the Angola – Namibia Transmission Interconnector Project (ANNA). The complete Environmental and Social Impact Assessment document is divided into three volumes: Volume I is this document, Volume II is the ESIA Report, and Volume III is the Environmental and Social Management Plan (ESMP).

The aim of the project is to alleviate the current electricity supply constraints and to contribute towards the security of energy supply by enhancing the distribution of electricity in the region. From its conception, the ANNA project has had the objective of promoting the highest positive economic, social and environmental impact possible whilst ensuring that all negative social and environmental impacts are addressed by avoiding negative impacts, or where they can't be avoided, minimising and compensating over and above the estimated impacts. This philosophy aims to ensure that the project attains a net positive social and environmental impact and contributes to the overall sustainable development of Angola and Namibia. These considerations were included in the initial conception of the project by means of selecting a route for the transmission line corridor that would avoid all identified sensitive environmental and social resources, as much as possible.

These objectives combined contribute towards the United Nations Development Programme (UNDP) Sustainable Development Goals (SDGs) and demonstrates progress towards the additional objective of climate co-benefits. The project design also included the applicable mitigation and adaptation measures, in order to minimise its vulnerability to climate change and increase its resilience.

The Southern African Power Pool (SAPP) has appointed Aurecon South Africa (Pty) Ltd ("Aurecon") to conduct the ESIA process for the ANNA Project. SAPP co-ordinates the planning, generation and transmission of electricity for the power utilities of member states within the Southern African Development Community (SADC). SAPP has started planning for the Angola-Namibia (ANNA) Transmission Interconnector Project to reduce the electricity supply difficulties being experienced and to contribute towards achieving a reliable and consistent electricity supply in the region. The planned project is a 362 km long 400 kV overhead transmission line stretching across Angola and Namibia. The Angolan and Namibian national power utilities will co-operate to develop the Project.

The Project is funded by the European Union (EU) and funds are administered by the Development Bank of Southern Africa (DBSA). An ESIA process is needed to meet the DBSA's international standards for environmentally and socially sustainable development, and to adhere to Angolan law. Aurecon's role includes undertaking the preliminary engineering design, as well as the ESIA, for the most suitable transmission line route (referred to as a "corridor").

What is the objective of this Non-Technical Summary?

The Non-Technical Summary aims to provide the description of the ESIA process and its findings in a manner that is simple to read and that can easily be understood by the general public.

The NTS acts as a support to the stakeholder engagement process. It allows the findings of the assessment to be presented to stakeholders in such a way as to ensure that all interested and/or affected parties have the opportunity to provide their input so that all relevant comments are incorporated into the final ESIA documentation to inform decision-making on the project implementation.

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1 The process is referred to as an ESIA process internationally, but Angolan legislation uses Environmental Impact Assessment (EIA) process. The term ESIA is used in the ESIA documentation and also therefore in this NTS.

What is the Environmental and Social Impact Assessment (ESIA) process?

In accordance with the requirements of national legislation, as well as international good practice, the licensing of projects that "*due to their nature, size or location have implications on the environmental and social balance and harmony, are subject to a prior Environmental Impact Assessment process, to be submitted for the approval of the governmental body responsible for the environmental area* ".

The ESIA process is carried out before such a project may proceed and it identifies negative and positive impacts on the environment (biophysical, socio-economic and cultural) that could be caused by a proposed development. It also assesses different ways of undertaking the Project, so as to avoid or manage the negative impacts of the Project or enhance positive impacts. The aim is to ensure that the Project is environmentally and socially responsible.

In Angola, in accordance with Decree no. 51/04 of 23 July on Environmental Licensing (related to the Environmental Impact Assessment (EIA) process and Decree No. 59/07 of 13 July), this process is initiated by preparing an ESIA report for a project and submitting it to the National Directorate for Prevention and Evaluation of Environmental Impacts (DNPAIA). An ESIA report is therefore essential for the licensing of the ANNA Project. If the DNPAIA issues an Environmental License for the Project, the licensing process will start. To obtain a full environmental license to go ahead with a project, two licenses are needed: 1) the Environmental Installation License, related to the construction phase of a project; and 2) the Environmental Operation License, which considers the operational phase of a project.

To be able to undertake the ESIA process for the ANNA Project, several technical, social and environmental studies were done. The ESIA documentation integrates this information, and also includes an Environmental Management Plan (EMP) that is supported by a Stakeholder Engagement Plan (SEP), a Vulnerable Groups Plan (VGP) and a Resettlement Policy Framework (RPF).

The two main phases in the ESIA process are:

- **Scoping:** This is to improve the efficiency and focus of the ESIA Phase that follows. Besides identifying issues and impacts, it focuses the impact assessment by exploring alternatives, identifying national legislation and lender requirements (DBSA for ANNA), detailing how the ESIA will be done by compiling a Terms of Reference (TOR), and by gathering stakeholder opinions about a project. The findings for ANNA Project were documented in a Scoping Report which was submitted to DNPAIA, and also provided to the Cunene and Huíla Provincial Administrations as part of the stakeholder engagement process. No comments have been received to date on this document.
- **Impact Assessment (ESIA):** During this phase, the focus is on measuring how significant the identified impacts are expected to be, and then providing solutions to manage these impacts by either reducing (negative) or increasing (positive) them. The ESIA documentation for ANNA includes several volumes that record the Project's environmental and social impact assessment, mitigation, monitoring and public disclosure and engagement, namely:
  - **The Environmental and Social Impact Assessment (ESIA) report (Volume II)**: This provides details of what the Project is; describes the regulatory and policy framework for the ESIA process; provides a description of the current state of the affected environment for physical, biological and socio-economic aspects; assesses the significance of potential impacts, identifies mitigation measures (solutions) to avoid or reduce negative impacts, and enhance positive ones; synthesizes potential cumulative impacts, analyzes cross-cutting issues and the sustainability of the Project, evaluates the Project's compliance with

international safeguards, provides conclusions and recommendations, and establishes the way forward for the ANNA Project.

- **The Environmental and Social Management Plan (ESMP) (Volume III)**: This operationalizes the proposed mitigation measures, establishes the monitoring plan to be implemented, defines the institutional responsibilities and training requirements, and how this plan will be reviewed, monitored and audited. As supporting annexures, it includes:
  - A Stakeholder Engagement Plan (SEP) that sets out the requirements for consultation of all stakeholders during the whole project life cycle;
  - A Vulnerable Groups Plan (VGP) focussing on the special engagement needs for the vulnerable groups such as the Himba and San (classified as Indigenous Peoples), women, people with disabilities, etc.; and
  - A Resettlement Policy Framework (RPF) - As resettlement is required, this document guides the development of the Project in order to ensure that the affected populations and communities are properly engaged during the Project development and are compensated for any losses or damages that may result from the implementation of this transmission line.

All the phases of the ESIA process for this Project are:

THE PHASES IN THE ESIA PROCESS		
1	PRE-FEASIBILITY / SCREENING	• Identify environmental and social issues based on desktop investigation of the study area • Conduct a multi-disciplinary Multi-Criteria Option and Route Selection Workshop • Pre-application meeting with DNPAIA to introduce the proposed project and agree on the approach for the ESIA since it is a transboundary project financed by international entities
2	APPLICATION	• Review of project against EIA regulations' listed activities to determine the need for an ESIA process • Compile and submit the application form to DNPAIA
3	SCOPING	• Compile Scoping Report (SR) to provide information on the proposed project and indicate potential issues and impacts to be studied in detail during the ESIA (in the Terms of Reference) • Stakeholder engagement process to notify I&APs of the project and to obtain comments • Finalise SR by addressing any comments and queries received • Submit SR and Terms of Reference for ESIA to DNPAIA for comment and inputs
4	IMPACT ASSESSMENT	• Compile ESIA Report and associated documentation, including the Environmental and Social Management Plan (ESMP), the Resettlement Policy Framework (RPF), the Vulnerable Group Plan (VGP) and the updated Stakeholder Engagement Plan (SEP)
5	DECISION	• Submit the ESIA Report to DNPAIA for consideration and approval • DNPAIA consultation with relevant government departments • DNPAIA to lead the ESIA Stakeholder Engagement/Public Consultation session(s) • DNPAIA drafts the Public Consultation Report • DNPAIA to issue a decision, notify RNT and issue the Environmental Installation Licence after payment of tax • Project proponent to notify all I&APs of DNPAIA decision
6	IMPLEMENTATION	• If Environmental Installation Licence is issued, the applicant can undertake the detailed design for the project, giving consideration to environmental and social requirements emerging from the ESIA process, and call for tenders for project construction • Construction can then commence, guided by the ESMP and conditions stated in the Environmental Installation Licence • Once the construction is finalised, a request for the Operational Environmental Licence should be submitted to DNPAIA • After an Environmental Audit of the project, DNPAIA issues the Operational Environmental Licence • Operation, maintenance, and decommissioning of the project to be in line with the requirements of the ESMP and with conditions of Operational Environmental Licence

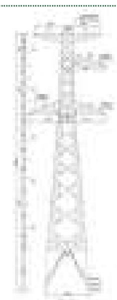
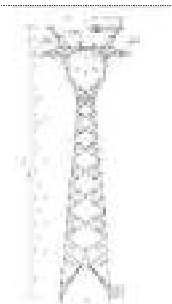
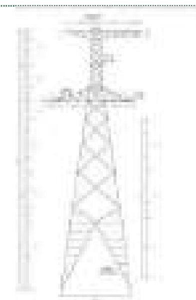
What is the ANNA Project?

The Project is a 400 kV overhead transmission line, with a total length of approximately 362 km, from the Kunene substation in Namibia to the Lubango substation in Angola. The lengths of the transmission line within southern Angola and within northern Namibia are 331 km and 31 km respectively.

The Namibian section of the line will be owned and operated by NamPower, whilst the Angolan section will be owned and operated by Rede Nacional de Transporte (RNT).

The Project is currently in the feasibility stage which means that there is not yet detailed information on the exact location of its components (such as pylons). This will only be decided during the Project's detailed design stage. However, for the ESIA process, a study area consisting of a 2 km wide strip was used (corridor), but it is not yet known exactly where the line will be located within this corridor or where the towers/pylons will be installed. What is certain is that the transmission line will be constructed within this corridor, in a servitude of about 55 m wide.

Pylons will be between 300 m and 500 m apart, depending on the terrain and issues such as land use, and will be a combination of the following types of overhead suspension pylons:

FAA Suspension Pylon	YAL Suspension Pylon	YAS Suspension Pylon	YAA Suspension Pylon	YAT Terminal Pylon
				
Height Máx.: 33,0m Min.: 25,0m	Height Máx.: 54,5m Min.: 25,5m	Height Máx.: 45,5m Min.: 25,5m	Height Máx.: 33,0m Min.: 24,0m	Height Máx.: 33,0m Min.: 24,0m

These standard pylons will be used on all sections of the line, except the crossing of the Kunene River, where specially-designed taller pylons will be needed for the crossing distance of more than 800 m.

A 20 m wide strip will be cleared of trees and obstacles within the 55 m servitude (for the transmission line), as well as a footprint of about 20 m x 20 m around each pylon.

One substation will be built in Cahama on an area of about 300 m x 200 m, which will also have to be completely cleared.

Where will the Project be built?

The transmission line in Angola starts at the planned Lubango substation, north-east of the town of Lubango, from where it runs east for ± 6.5 km and then turns south-east for ± 65 km. The route then turns south-southwest, bypassing the Bicuar National Park, and runs for ± 93 km until it meets the Lubango-Cahama road, near Capanda, and follows its course for about 35.5 km until the line reaches Cahama. Near Cahama the line turns in a westerly direction towards the proposed Cahama substation. After the Cahama substation, the transmission line runs in a south-easterly direction for ± 91 km and then south-west for another ± 40 km, whereafter it reaches the Namibian border.

Project location in Angola and Namibia

How was the route chosen?

Three potential routes/corridors and 11 route line segment alternatives were identified during the **pre-feasibility** phase.

↓

The alternatives were chosen based on slope, length and whether they crossed sensitive environmental, or densely populated or agricultural, areas, or heritage resources.

↓

The three corridor options and 11 line segments were compared through a Multi-criteria Decision-making Model (MCDM) process, and the best route was identified.

Why is this Project needed?

The Project intends to link the Namibian and Angolan electricity networks, in the north-western part of Namibia and the southern part of Angola, initially supplying power to towns in the southern part of Angola (see red circle in adjacent image), as well as to make provision for the future integration of the proposed Baynes Hydro-Power Station 400 kV line(s).

Expected economic benefits at a strategic national level are to unlock alternative, cheaper energy-generation sources, improved access to cleaner energy sources (with lower emissions), reduced cost of transmission (due to an increase in transmission route options) and a reduced risk of supply interruptions. Benefits are therefore largely at a national level for each country.

Reduction in regional emissions has a number of environmental and societal benefits, all of which contribute towards the United Nations Development Programme (UNDP) Sustainable Development Goals (SGDs).

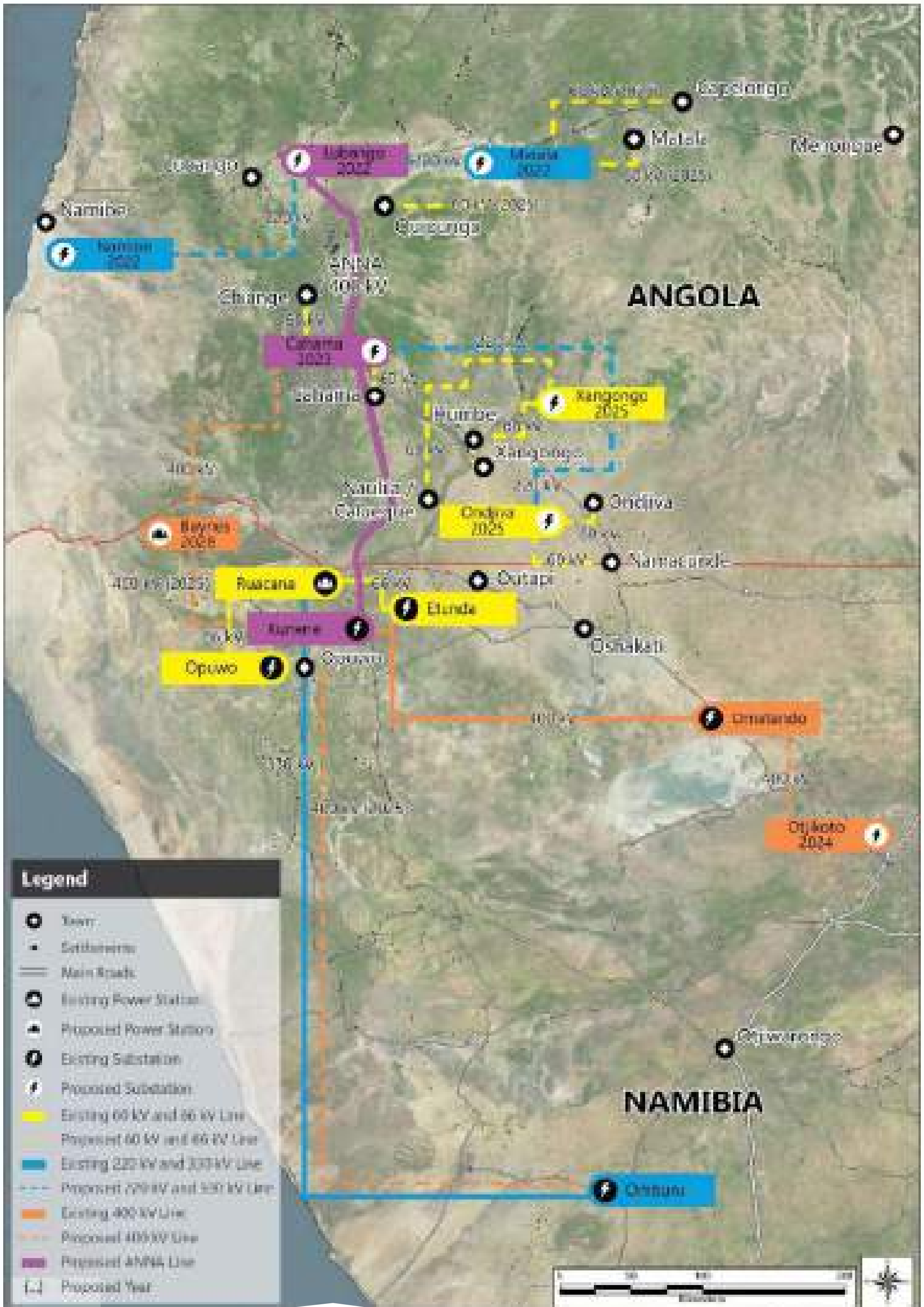
What benefits will the Project provide to Angola?

The ANNA Project will enable electricity to be provided to several settlements in Angola, mainly municipal and communal administrative centres (see image below) in Huíla and Cunene Provinces. In the Angolan part of the ANNA Project, this will be done by creating distribution substations, linked to transmission substations associated with this Project, namely:

- Lubango Substation (transmission – transform 400 kV to 200 kV) to:
  - Matala Substation (distribution– transform 200 kV to 60 kV): provision to Matala, Capelongo and Quipungo
- Cahama Substation (transmission – transform 400 kV to 200 kV) to:
  - Cahama Substation (distribution– transform 200 kV to 60 kV): provision to Cahama and Chiange
  - Xangongo Substation (distribution– transform 200 kV to 60 kV): provision to Xangongo, Humbe and Nalulila/Calueque

– Ondjiva Substation (distribution– transform 200 kV to 60 kV): provision to Ondjiva and Namacunde

At this stage of the project, details regarding the location of the proposed distribution substations, and the routes of the electricity lines that will connect this infrastructure, are unknown.



Electricity grid dependent on the implementation of the ANNA Project

What activities will take place?

Pre-construction

- Resettlement planning and implementation;
- Detailed survey to decide on alignment (avoidance of assets will be prioritised);
- Servitude application, where required;
- Land use/acquisition process;
- Check survey for exact pylon locations;
- Geotechnical investigation of chosen substation and pylon locations to inform foundation design;
- Final designs;
- Demining.

Construction

- Vegetation clearance to facilitate access and construction;
- Set-up of construction camps;
- Transportation of materials to site;
- Movement and operation of heavy machinery and equipment;
- Waste production and management;
- Installation of foundations for the towers;
- Assembly and erection of towers;
- Cable-stringing and installation of earth conductors;
- Demobilisation of construction work sites;
  - Rehabilitation of the affected areas;
  - Handling and disposal of construction waste;
- Environmental and social monitoring and resettlement follow-up.

Operational

- Operation of the transmission line;
- Periodic inspections, monitoring, maintenance of the line;
- Vegetation management along the servitude (bush clearing);
- Waste production and management; and
- Enviromental and social monitoring, including resettlement follow-up.

What is the Project's area of influence?

Within the scope of the ESIA report, a 2 km wide corridor was evaluated as the potential area of direct influence of the Project, along the entire length of the route, in which all the constraints to the Project's implementation were identified.

Direct Area of Influence (DAI): The biophysical DAI was defined as the 2 km wide corridor (1 km on either side of the centreline of the proposed transmission line) for the total length of the line (i.e. 331 km), from where it exits Lubango substation until it reaches the Cunene River (the border with Namibia). This area is also referred to as 'the study area' and includes the proposed Cahama substation area, as well as an area of 500 m around it.

The **Indirect Area of Influence (IAI):** For most of the biophysical aspects, this is a 10 km corridor (5 km on either side of the centreline of the proposed alignment).

The socio-economic DAI and IAI are both 10 km corridors (5 km on each side of the centreline) and include the following communities:

Province	Municipality	Community
Huíla	Lubango	Lubango
		Hoque
	Chibia	Capunda Cavilongo (also Kapunda Kavilongo)
		Quihita (also Kihita)
	Gambos (ex-Chiange)	Chimbemba
Cunene	Cahama	Cahama (also Kahama)
		Otchinjau
	Curoca	Chitado
	Ombadja	Humbe
		Naulila

To define a **Regional Area of Influence (RAI),** the affected provinces in southern Angola, namely Huíla and Cunene, and the Omusati and Kunene regions in northern Namibia, were included at an initial level of influence. The second layer of influence comprises the national territories of Angola and Namibia, as providers and recipients of the energy transmitted by the ANNA Project and, finally, at the furthest extent of influence, are the Southern African member countries of the Southern African Power Pool (SAPP) as end-beneficiaries of the overall grid connection.

What is the current situation?

The evaluation of the current situation of the study area was divided into three main sections: Physical, Biological, and Socio-economic and Cultural environment, as per Angolan EIA Regulations requirement.

Physical Environment

Climate change: An increase in the number of days with extreme daytime temperatures is expected, as well as in the number and duration of heatwaves. The number of warm nights is also expected to increase general discomfort and to reduce overnight frost and morning dew. In areas where either increasing or decreasing rainfall volumes are expected, rainfall will be more intense over shorter timeframes and it is expected that dry spells between rainfall events will be longer. South-western Angola is particularly vulnerable to climate change due to its arid nature and high dependence on natural resources.

Angola is considered as one of the countries in sub-Saharan Africa that is most vulnerable to the effects of climate change. In the Huíla and Cunene Provinces (especially the latter), variable and extreme climate is possible, with regional reductions in rainfall. Climate change impacts on natural resources alone (agriculture and fisheries) will affect mostly the poor because they are highly dependent on natural resources. Angola's rural communities and poor are the most vulnerable to negative impacts as a result of climate change. This vulnerability is exacerbated by poor service delivery to remote areas, as it is generally considered prohibitively expensive. In addition, low population densities, long travel distances and the lack of infrastructure all increase Angola's vulnerability to climate change. Increasingly, the capacity of farmers, pastoralists and natural resource managers to adapt, is being compromised.

Geology and geomorphology: The geology of the region is dominated by different geological formations (magmatic, metamorphic and sedimentary). In terms of tectonics, Angola is classified in the lowest seismic (i.e. earthquake) risk classes, but faults have been identified along the study area.

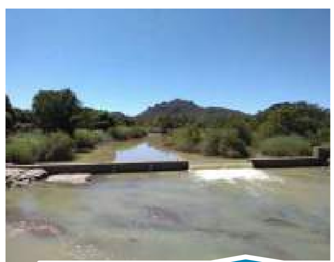
Contrasting morphology with the surrounding flatness

In the study area, flattened areas with slopes of less than 2%, are dominant, although to the east of Chibia there are several hills (rocky outcrops that stand out in the landscape) of anortositic rocks.

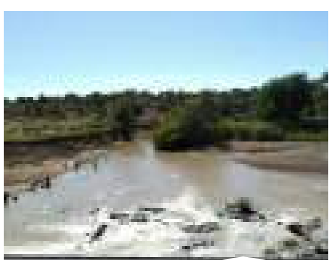
No outcrops have been identified as geological heritage features with conservation status, although an initiative carried out in 2014 called "Seven Natural Wonders of Angola" mentions one feature in the province of Cunene, namely the Ruacana Falls (category Waterfalls).

Water resources: In national or regional hydrographic terms, the project corridor is located in the Cunene (or Kunene) River basin. The Cunene River arises about 32 km north-east of Huambo in the Encoco mountain range in Angola and flows southwards from the Angolan plateau to the Namibian border, after which it runs westwards, forming the border between the two countries until the river reaches the Atlantic Ocean. The lower course of the river runs through a deep gorge that begins at the Ruacana Falls.

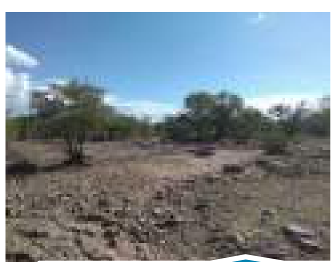
Water uses by the people



Caculuvar River



Caculuvar River



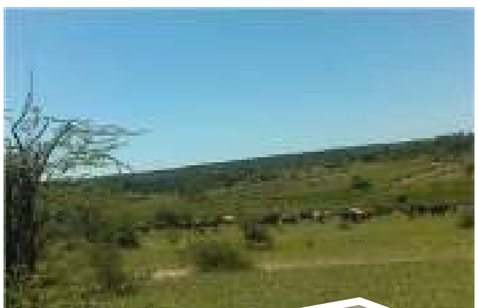
Dry riverbed near Cahama

During the field surveys, conducted in April 2019, several noteworthy watercourses within the study area were visited. These watercourses are all different in terms of flow rates and are used for different purposes by local people (for example fishing and watering animal stock). Occasionally surface water is consumed by the local people.

The largest groundwater storage areas correspond to the Kalahari sedimentary formations. No transboundary aquifers occur within the project area, although several groundwater abstraction points were identified (mostly vertical holes and wells).

Example of a water pollution incident

The project corridor is located in a sparsely-populated area, but intersects one significantly populated area, namely Cahama. Surface and/or groundwater pollution is limited within the study area, even though some activities and infrastructure have been identified as potential hotspots of contamination, such as: agricultural activities/developments in the alluvial lowlands of several rivers, livestock, quarries, domestic washing in watercourses, roads and aerodromes.



Cattle grazing

Soils and land use capability: According to the Soil Atlas of Africa, the study area includes soil types that are strongly altered with reduced nutrient levels (Ferrasols), strongly altered sandy soils with a high iron content (Arenosols), soils with significant calcium carbonate accumulation and a horizon that is rich in clay minerals (Calcisols), soils with expansive clays and calcium carbonate accumulation (Vertisols), and shallow soils on rock (Leptosols).

The most representative land cover (i.e. vegetation cover) units are Closed to Open Grassland, that occupies 35% of the study area, followed by the Mosaic Vegetation/Croplands, representing 21%, the Open Broadleaved Deciduous Forest with 21%, and finally the Closed to Open Shrubland with 14%. The remainder of the land cover units represent 10% of the total cover and, as such, have very little representation in the area.

The only existing urban settlements in the study area are the village of Capunda Cavilongo (located in the northern sector of the corridor) and the village of Cahama (in the central area of the corridor).

Air quality: In the urban areas of Angola, the main sources of air pollutants are related to traffic, industrial plants/installations, infrastructure such as airports, and diesel generators to produce electricity when the electricity grid fails. In the rural areas (the majority of populated areas within the study area), air quality is mainly affected by traffic, diesel generators (primarily in the municipal and community centres) and dust emissions from unpaved roads. These emissions are, however, considered insignificant.

Ambient noise: The noise in the region is influenced by land use and occupation activities. In the urban area of Lubango, the ambient noise is mostly influenced by traffic. The other contributors to noise include: diesel generators, industrial sites, construction sites, aircraft (from the airport) and locations hosting large gatherings of people (markets, public services/administrative buildings, churches, schools, hospitals, etc.). For the rest of the study area, environmental noise is primarily influenced by the traffic on roads.

Biological Environment


Mopane shrubland

Angola's geographic location, geological history, climate and physiography account for its rich biological diversity. The ANNA corridor crosses the Angolan miombo woodland, Zambezian *Baikiaea* woodland, and Angolan mopane woodland ecoregions. The latter has a high species richness and is considered an essential resource for both people and wildlife in the region.

The Bicuar National Park is, at its closest point, 500 m east of the transmission line corridor. This Park, located in the Huila Province, has a total expanse of 790 000 ha.

The infrastructure of the Bicuar National Park was recently rehabilitated and now has four inspection posts, with facilities for the management and administration of the Park. The fact that the Park is not fenced, and that cattle (from adjacent agricultural settlements) are frequently found within its boundaries, encourage poaching activities that threaten the Park's biodiversity.


Invasive alien prickly pear

Angola is botanically rich and floristically diverse with approximately 32 vegetation types and 6 850 indigenous plant species, of which 14.8% are viewed as endemic (i.e. occurring only in this area).

The Angolan Red List of Species also lists 17 species as invasive aliens to Angola and, during the site visit, at least five of these invasive alien species were confirmed as occurring along the Project's indirect area of influence, mostly associated with human settlements.

At least 59 reptile species are expected to occur in the general area of the Project, of which three species are endemic. Of these, 33 species are expected to be from Angola but, as reptiles are under-recorded throughout the general area, at least 15 species of amphibians could occur in suitable habitat.

According to literature, at least 127 species of mammals are known, and/or expected, to occur in the general area, of which 25 species are expected to occur in Angola. It is, however, expected that species are under-represented for the general area with regards to bats and rodents.

The Lubango-Namibe arid bushveld and desert area (along the ANNA corridor) is viewed as one of the key birding areas in Angola, with unique species present such as the Cinderella waxbill, Benguela long-billed lark and Rüppell's korhaan. Wetland bird species from southern rivers, lagoons and reed swamps include at least 49 species, while species identified in the riparian woodlands and swamp forests of central and southern Angola include at least 59 species.

The areas considered more important, due to the presence of significant habitats for avifauna (as this is the group most likely to be affected by the ANNA Project) consist of the following "High Risk" (red) and "Medium Risk" (orange) areas:

Granite Inselbergs

Caculuvar River

Kunene River

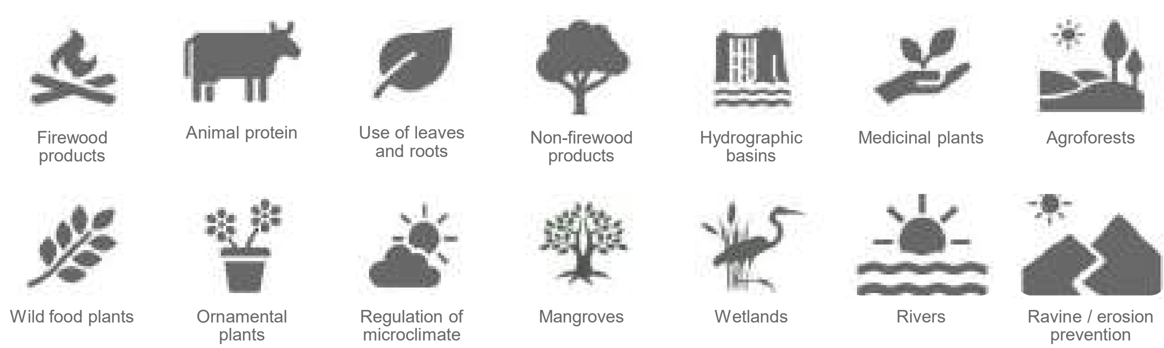
Ephemeral river and pan system: Munano/Uvaie

Ephemeral river and pan system: north-east of Cahama

Ephemeral river and riparian area: Calovango

While these habitats are important mostly from an avifaunal perspective, it is necessary to emphasise that the study area does not include any critical habitat, as defined by the DBSA and IFC.

Ecosystem services provide benefits that are used by humans and, in doing so, affect human wellbeing such as livestock, ground/surface/fresh/salt water, fish, soil formation/composition, tourism, recreation, spiritual interactions, etc. The Cunene and Huíla Provinces have few ecosystem services when compared to other regions, mainly due to climate change issues such as drought and flooding, which are exacerbated by overgrazing, mainly by cattle. The most important services are:



Socio-economic Environment

Demographic and socio-economic aspects: The distribution of the population depicts a territory with a low population density of 32 inhabitants/km^2, which is still higher than the country's average density of 20.7 inhabitants/km^2. The indirect area of influence (IAI) maintains the characteristics of a rural territory, with 54.4% of the population concentrated in rural areas.

Despite being a low-density territory, the IAI is characterised by a mosaic of ethnic diversity, distinguished by its own geographical distribution, activities, traditions and languages (although Portuguese is the official language of the country). According to the field interviews, the population belongs mainly to the Bantu ethnolinguistic family (predominant language of southern Africa), represented by *Nyaneka-nkhumb*. In addition to the mentioned groups, consulted literature suggest the presence, in certain areas of the IAI, of the *San* (from the *Khoisan* ethnolinguistic group of the non-Bantu family, one of the oldest ethnic groups living in south-west Africa). This group of hunters (also known as *Bushmen* or *Boxmen),* as well as the Himba/Mundimba, still preserve the habits, uses and customs of nomadism, and are considered as indigenous people, with a stronger presence in the southern part of the corridor.

Mumuila Woman

Mundimba Woman

San Woman

Transport and mobility: Within the direct area of influence (DAI), transport and mobility is characterised by an insufficient and precarious road network, which hinders access to various areas and settlements. The routes are mostly dirt roads that tend to be impassable during the rainy season, and communities can be isolated for long periods of time.

EN105 – National road 105

The only roads that are surfaced and in reasonable condition are the EN105 (which connects the city of Lubango to the village of Cahama) and the secondary road that connects the village of Cahama to the communal headquarters of Chitado. Besides the poor condition of the road network, there may also be landmines on the routes within the study area (especially from the village of Cahama southwards to the Namibian border), remaining after the Angolan Civil War.

Dirt track

Land use: In Angola land is classified as state property, bequeathed primarily by ancestors. In rural areas, the Sobas have the responsibility to organise and protect community land, to adjudicate land disputes and to allocate land to families or individuals who may not have access to farmland or housing. In urban and peri-urban areas, access to land depends on both the property market and of land inheritance.

Woodlands play a significant social role in the DAI, as they are a source of firewood which is used in daily activities, and of charcoal, which is sold along the main roads. Local communities use the forest as a source of raw materials for construction purposes, livestock feed, as an area in which to collect fruits and wild plants, and even for hunting (usually small game), all of which are used as subsistence resources (especially in dry periods) as well as for medicinal purposes. In this region, the forest is also part of an important transhumance corridor that extends from southern Namibia to the province of Huila.

Transhumance in the woodlands of the corridor

The study area has a markedly rural territory and a low occupancy density, although it comprises two geographical areas with different organisational structures and socio-economic dynamics, namely the northern and central sectors (up to the village of Cahama) and the southern sector (from Cahama to the border with Namibia).

The northern and central sectors (up to the village of Cahama) have a greater population density, and communities usually form a concentrated rural settlement. They are mainly engaged in subsistence farming (primarily maize, massambala and beans) on small agricultural land parcels located near their homes. Agriculture is often complemented with livestock farming (mainly cattle) according to a fixed grazing system on the pasture areas surrounding their dwellings.

Housing in the northern area of the DAI ("pau-a-pique")

Enclosures around "family villages"

In the southern area of the study area (from Cahama to the Namibian border), rural settlements are generally sparse, with a considerable extent of land displaying a low population density. Settlements become more common towards the border. This type of settlement is strongly linked to livestock farming (mainly cattle), which is complemented with subsistence agriculture when the soil conditions allow it (mainly massango, a very drought-resistant crop, complemented by massambala, a more demanding crop).

Services: Most communities have limited access to basic services. They use firewood as their main source of fuel for domestic activities and, in order to obtain water for domestic needs and for livestock watering, they make use of natural water resources, such as watercourses and ponds, as well as any existing boreholes.

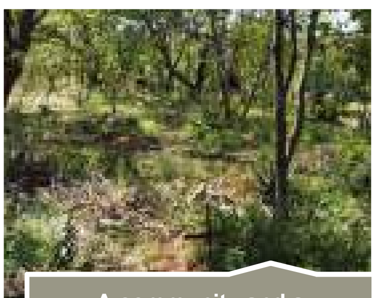
In the areas furthest from the communal headquarters, women (who are responsible for collecting water) often need to travel long distances to water sources. Sanitation and waste collection services are non-existent. Rural communities have limited access to health and education (health and education networks are insufficient to meet their needs).

Heritage: In terms of archaeology, on two occasions during the fieldwork, Middle to Late Stone Age Tools and Cores were identified in the IAI. One find was at Calovango and another was further south. None of these were, however, representative of a defined Stone Age inhabited or manufacturing site, although these may be present within the DAI. No Iron Age sites were documented along the study corridor during the fieldwork, but the background research and the isolated pottery remains found, suggest that these types of heritage sites will certainly be present in other areas of the corridor.

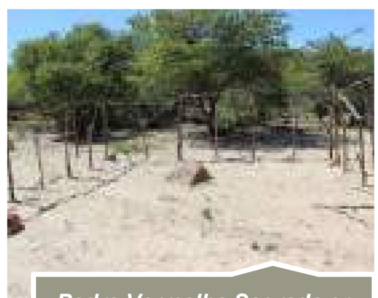
Middle to Late Stone Age cores at Calovango

Angola has recently been the centre of attention within the palaeontological world with the discovery of very fossil-rich deposits along its south-western coastline. However, none of the associated geological formations are located close to the ANNA corridor.

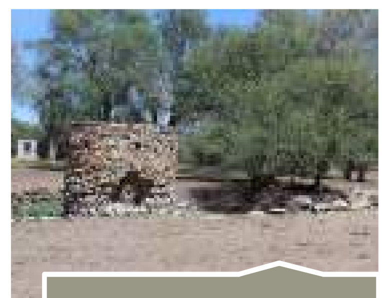
None of the documented heritage features for Angola fall within the proposed study area. At Lubango there is one local religious site, namely the statue of "Christ the King". The only other significant heritage sites observed in the DAI are depicted in the images below.



A community and a "children's" graveyard close to Lubango



Pedra Vermelha Sagrada or "Sacred Red Stone", near Cahama

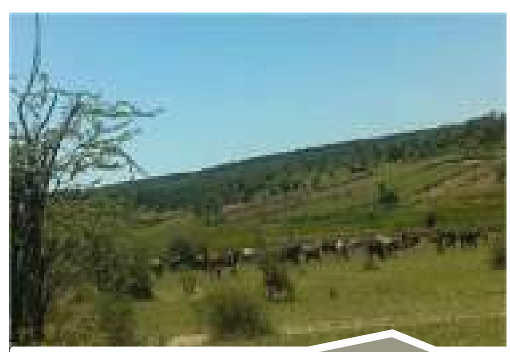


Stone cistern in Cavalango

Landscape: The terrain forms a plateau in the vicinity of Lubango, where the natural woodland almost completely disappears, and the landscape is represented by a patchwork of croplands, with small intercepted mosaics of natural vegetation associated with small human settlements.

Along rivers, naturally-occurring woodlands have been cleared to make way for small patches of subsistence farming. These cultivated areas are informally grouped and organically shaped. The landscape is further defined by a flat, to slightly undulating, terrain, with low-growing vegetation and networks of sandy footpaths linking smaller rural settlements with rivers and larger dirt roads.

In the vicinity around Cahama, moving south, the landscape becomes drier, and natural woodland becomes less dense. Human infrastructure is mostly grouped around the town of Cahama, where some of the buildings are still in a damaged state from the civil war.



Landscape south of Lubango

Landscape in Cunene Province

The southern section of the study area is represented by a semi-arid landscape, visually uniform with little manmade infrastructure, except for some smaller infrastructure elements around the Ruacana border post. The Kunene River forms a strong contrast with the surrounding parched landscape.

What are the expected impacts and proposed mitigation measures?

The potential impacts, after mitigation, that are expected to arise from the proposed project, are summarised in the figures below. Generally, the negative impacts of highest significance after mitigation, are associated with climate change (during construction and operation), as well as avifaunal mortalities during the operational phase. The positive impacts of highest significance after enhancement, are improved safety, as a result of demining operations, as well as an increased availability of electricity.

Construction Phase

Most of the expected negative impacts will occur during the construction phase as a result of activities such as the establishment of the construction camps, excavation of the foundations for the pylons and the Cahama substation and clearing work for the servitude access and for any additional access roads. These activities will result in the following impacts:

- Physical displacement of communities (resettlement) and of sites of cultural significance
- Economic displacement (local population's access to their livelihoods and natural resources)
- Removal of vegetation and disturbance of animals and birds
- Potential damage/disturbance of buried heritage resources.

Water will also be abstracted for use, and waste will be generated. Other activities such as the movement and operation of heavy machinery, will have a visual impact, cause noise and air emissions, and potential soil and water pollution. Health and safety issues for workers and the community are also a potential impact. The presence of non-local workers can lead to social problems, such as an increased risk of contracting diseases, petty crime, illicit activity, alcohol and drugs, unplanned pregnancies, gender-based violence (GBV) and conflicts caused by a lack of respect for the culture of the local communities. Ecosystem services could be affected by a number of these collective impacts.

These impacts can be reduced by applying general good practices through avoidance or minimisation such as the management and protection of topsoil, management of waste and wastewater, control and prevention of chemicals and spills, rational use of water, energy and natural resources, etc. The implementation of awareness programmes for the community and the workers, and the application of a contractor's Code of Conduct, are very important in the effort to reduce social and environmental impacts. Rehabilitation of all areas affected by the construction works is also a key measure to ensure that the temporary impacts are reversed.

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Current Situation

ANNA
TRANSMISSION PROJECT


Construction
Substation

To address the negative social impacts associated with economic and physical displacement of communities, including cultural resources such as graves, ceremonial sites or places-of-power, a comprehensive resettlement planning process, prior to construction, must be put in place. All forms of resettlement (physical and economic) should be avoided as far as possible, and compensation and livelihood restoration measures must be put in place where this is unavoidable. A Resettlement Policy Framework (RPF) was prepared by Aurecon as part of the ESIA process.

Of utmost importance is the implementation of the Stakeholder Engagement Plan (SEP) (an annexure to the ESIA Report), in collaboration with the local traditional and statutory authorities, to keep communities informed of activities in the most culturally-appropriate methods, with regular opportunities for engagement. The SEP provides for a Grievance Mechanism through which the communities can lodge any grievances.

Operational Phase

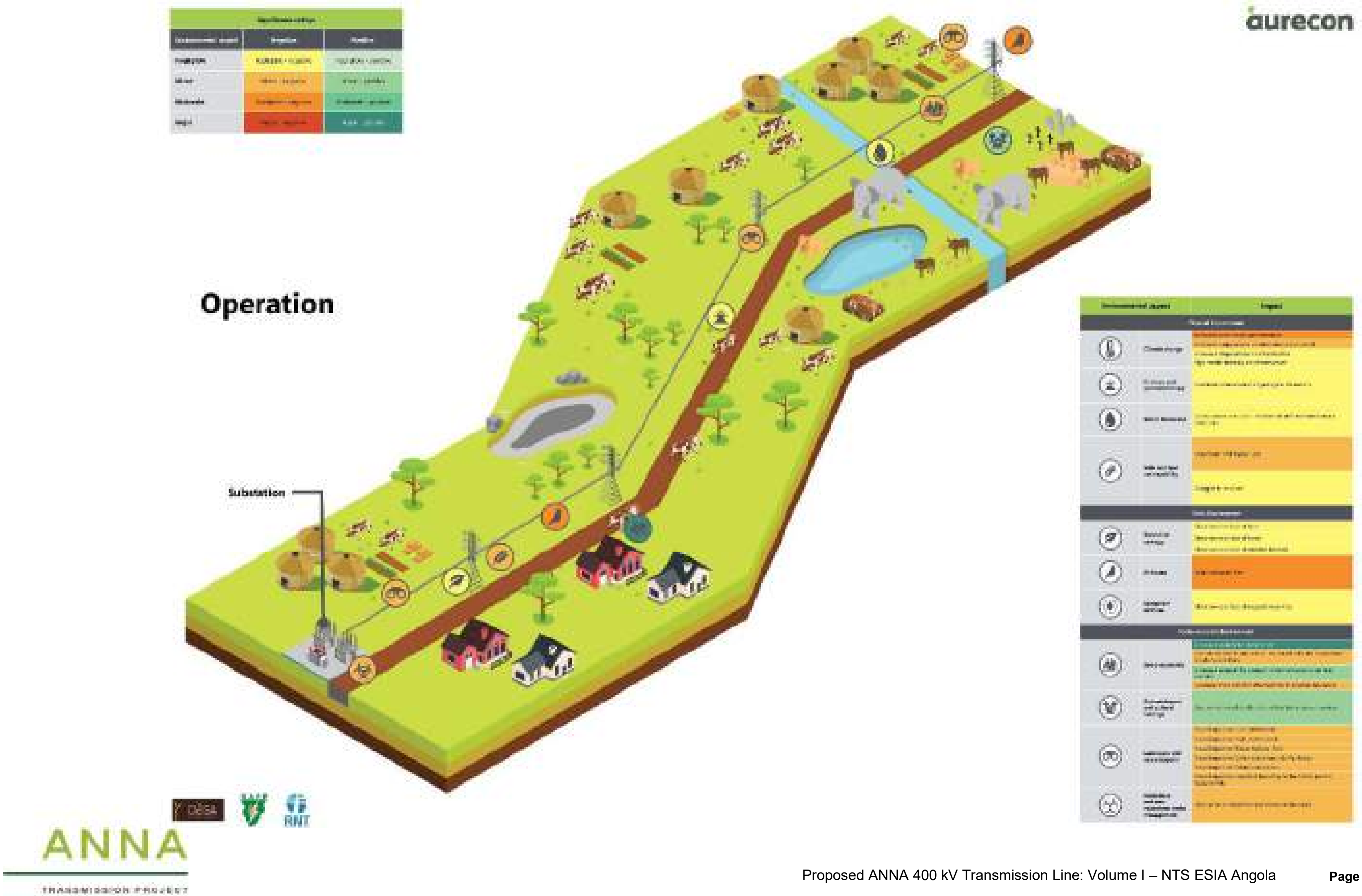
During the operational phase, no major natural resource inputs (such as water) are required, and no pollution emissions (such as air, soil or water) are anticipated. The most significant impacts are due to the clearing of vegetation in the servitude, either manually or with herbicides, and the resulting impacts on fauna and flora, soil erosion, and soil and water pollution (and hence also on ecosystem services). The presence of the pylons will have a visual impact and be a cause of bird mortalities (from collisions or electrocutions) as well as creating health and safety issues for local communities. Waste generation from the maintenance of the Cahama substation may also result in negative impacts.

Key mitigation actions include positioning and designing pylons and access roads, as well as the final location of the Cahama substation, to avoid sensitive areas and established vegetation, and to include deterrents for large mammals. The proper design and maintenance of access roads to reduce erosion, is also crucial and must be monitored.

The installation of bird avoidance measures in sensitive areas such as the Caculuvar and Cunene Rivers, the inselbergs (mountains) and the ephemeral drainage lines, is considered essential to mitigate the impact on birds. A bird collision monitoring programme, a reptile and mammal mortality monitoring programme, and a waste and hazardous material monitoring programme, were also included in the Environmental and Social Management Plan's operational activities (ESMP - Volume III of the ESIA).

Maintenance activities should also limit the extent to which vegetation is cleared, and only individual trees that pose a risk, should be removed. Climate change-related mitigation includes a greenhouse gas management plan to manage emissions throughout the project lifecycle.

Social mitigation includes the implementation of an awareness programme for communities and RNT staff regarding health and safety and other environmental issues, such as poaching, driving and road discipline, and identification of alien invasive and protected tree species. The SEP and Grievance Mechanism will remain in place during the operational phase of the Project to provide opportunities for stakeholders, especially communities, to engage with RNT.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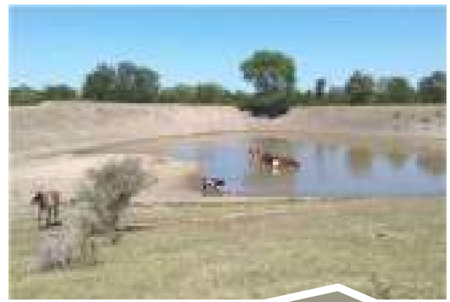
Operation
Substation
ANNA
TRANSMISSION PROJECT
RNT

What benefits will the Project bring to my community?

The ANNA Project provides a series of net positive contributions to its area of influence:

- As water availability is a major difficulty for the community, and water resources (surface and subterranean) are sometimes reported as being unfit for livestock and human consumption, it is recommended that the social consultants appointed during implementation, along with communities and traditional authorities, identify the most suitable locations for the implementation of boreholes and "chimpacas" within the corridor's area of influence. As a preliminary approach, it is proposed that the project funds the development of two boreholes and nine "chimpacas" (one for each affected communal administration).



Chimpaca / pond

- An issue raised by communities is that they have a poor electricity supply (or none at all). If the powerline passes through a community's area, it should bring tangible benefits in the form of a more secure and reliable power supply. As such, it is recommended that the project sponsors investigate this option by assessing which communities along the route are most affected by the lack of power, and install, for example, solar panels at agreed locations (such as schools, health centres, administrative buildings, etc.) to allow for a secure and reliable power supply. It is proposed the implementation of nine solar panels to serve selected infrastructures, in accordance with the feedback attained within the project's stakeholder engagement.
- With regards to habitat loss, although no critical habitat has been identified as being impacted, in order to mitigate the potential loss of natural habitat, it is recommended that consultation with the Angolan Environmental Ministry, Provincial Administrations, as well as other national institutions and NGOs, be undertaken, in order to investigate the possibility of contributing to an existing and/or relevant project within the concerned region. The project to be selected should include actions that contribute for the conservation or rehabilitation of natural areas and habitats or focus in areas like environmental education and awareness in order to ensure that the ANNA Project leaves a positive legacy. A study recently developed for the Bicuari National Park considered that this park would make an excellent candidate for a co-management relationship to help provide funds and other support its management and protection.
- In the southern part of the Cunene Province, overgrazing by domestic livestock (mainly cattle) has a large impact on the local biodiversity, particularly around water sources, and better livestock grazing management would improve the local environment. Opportunities to partner with government departments or NGOs could be a potential area of opportunity.
- Further research related to the cultural landscape of the corridor can be done by creating opportunities for local people to be trained in conducting research and documenting heritage resources.

A preliminary estimation of the budget to be located to these net positive contribution initiatives was included in the ESMP (Volume III). This will ensure that the ANNA Project includes financial provisions for the implementation of the above-mentioned activities and thus fulfil its commitment to contribute towards the sustainable development of the affected region. The proposed options for net positive contribution may change as the project develops. A preferred option may be identified through the project's stakeholder engagement, that might prove to be preferred by the affected communities, or that may be proposed by a government department or NGO to support an ongoing or planned project within the region.

What happens next?

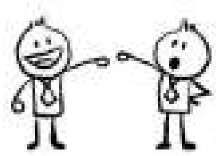
After the completion of the ESIA process, and if the ESIA report is approved, the Environmental Installation License will be issued, and the works related to the project's implementation (pre construction and, after, construction phase) can commence.

Before the start of any construction activity, a series of tasks need to be completed, and these include the resettlement planning and implementation, together with the livelihood compensation and land use/acquisition process, and the demining of all project affected areas (roads, pylon location, Cahama substation site, construction camps, other support areas, etc.), so that they are safe for the construction works to commence.

Some decisions can only be taken after the detailed survey has been done to fix the exact alignment of the transmission line, including an environmental and social specialists "walkdown" (route inspection), during which the avoidance of assets and important areas will be prioritised and identified. The final project design, including all surveys and investigations, including the resettlement implementation, that will lead to the final decision on the location of the substation and pylons, will then give way to the Project's construction.

Throughout these phases (from pre-construction to operation) several opportunities for engagement with concerned communities have been planned, as documented in the Stakeholder Engagement Plan (SEP) and the Vulnerable Group Plan (VGP). This will include a few engagements during the surveys and the preparation of the Resettlement Action Plan (RAP) and will continue during this plan's implementation. A Community Liaison Officer (CLO) will be appointed for the construction phase, and the connection established during this phase will be continued during operation through the local RNT offices.

How can I engage with the ANNA Project?



Current engagement opportunities: Public participation is a key component of any ESIA process and takes place at various stages throughout the Project's lifecycle.

Currently, you can become involved in the ESIA process through attending one or more of several public meetings that are being held. A contact form is also available for those who wish to participate in a more formal way or want to add a comment or information, or ask a question, outside of these meetings.

All issues and comments received during the public consultation period will be documented and responded to, and the ESIA documentation will be updated and amended where relevant. The final version of the ESIA documentation will then guide the next steps of the Project development, such as the resettlement activities, the engagement with the communities during construction and operation, and the monitoring programmes to be implemented throughout the Project's lifecycle.

Grievances: There is a Grievance Mechanism in place which stakeholders can use to report any concerns, issues or complaints at any stage of the Project. It aims to provide an easy and safe way for communities to communicate with RNT and all other parties associated with RNT, such as contractors, consultants, social engagement personnel, etc. During construction and operation, people will be identified who will regularly be visiting the Project area and with whom the community can engage with face-to-face if preferred.

The contact details for the representatives of the parties involved in the ANNA Project, at the current stage, are listed in the table at the start of this document.

ANNA

TRANSMISSION PROJECT

ANNA TRANSACTION ADVISORY SERVICES

Environmental and Social Impact Assessment

Angola

Volume II - Environmental and Social Impact Assessment (ESIA) Report

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VOLUME II – ESIA REPORT: TABLE OF CONTENTS

List of Annexures

List of Figures

List of Tables

ABBREVIATIONS

Abbreviation	Definition
AAAC	All-Aluminium Alloy Conductor
AC	Alternating Current
ACSR	Aluminium Conductor Steel Reinforced
AIDS	Acquired Immune Deficiency Syndrome
AML	Lubango Municipal Administration (Administração Municipal do Lubango)
ANNA	Angola-Namibia Interconnector Project
ANR	National Waste Agency - Agência Nacional de Resíduos
BAU	Business as Usual
BCE	Before the Common Era
BESS	Battery Energy Storage System
°C	Celsius
CBD	Convention on Biological Diversity
CCS	Carbon Capture and Storage
CE	Common Era
CITES	Convention on International Trade in Indigenous Species
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COP	Conferences of the Parties
DAI	Direct Area of Influence
DBSA	Development Bank of Southern Africa
DoD	Depth of Discharge
DNPAIA	Direcção Nacional de Prevenção e Avaliação de Impactes Ambientais - National Direction for Prevention and Assessment of Environmental Impacts
DRC	Democratic Republic of Congo
EBRD	European Bank for Reconstruction and Development
ECB	Electricity Control Board
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
EL	Environmental Licence
EMF	Electromagnetic Field
ENDE	National Electricity Distribution Company
ENSO	El Niño–Southern Oscillation
EO	Environmental Officer
EPC	Engineering, Procurement, Construction
EPFI	Equator Principles Financial Institution
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESSS	Environmental and Social Safeguard Standard
EU	European Union
Ex	Extinct Species
FACTS	Flexible AC transmission systems
FI	Financial Intermediary
FNLA	National Front for the Liberation of Angola
FPIC	Free, Prior and Informed Consultation
GCM	Global Climate Models
GEF	Global Environment Fund

Abbreviation	Definition
GHG	Greenhouse Gas
GIS	Geographic Information System
GM	Grievance Mechanism
GRAE	Angola's Revolutionary Government in Exile
GWP	Global Warming Potential
ha	Hectare
HDPE	High-density polyethylene
HIV	Human Immunodeficiency Virus
HVAC	Heating, Ventilation and Air Conditioning
HVDC	High Voltage Direct Current
IAI	Indirect Area of Influence
I&AP	Interested and Affected Party
IBA	Important Bird Area
ICP	Informed Consultation and Participation
IFC	International Finance Corporation
INDC	Intended Nationally Determined Contribution
INRH	National Institute of Water Resources of Angola
IP	Indigenous People
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IRP	Integrated Resource Plan
ISO	International Standards Organization
ITCZ	Inter-Tropical Convergence Zone
IUCN	International Union for Conservation of Nature
km	Kilometre
kT	Kilo Tonnes
kV	Kilovolt
LIDAR	Light Detection and Ranging
LLSU	Large Livestock Stock Units
L&FS	Life and Fire Safety
LSA	Later Stone Age
LVIA	Landscape and Visual Assessment
masl	Metres above sea level
MANco	Management Committee
MAV	Maximum Allowed Values
m	Metre
m^2	Square Metre
MCDM	Multi-Criteria Decision Making
MFA	Armed Forces Movement
MINAMB	Angolan Ministry of Environment
MPI	Multidimensional Poverty Index
MPLA	People's Movement for the Liberation of Angola
MSA	Middle Stone Age
MVA	Mega Volt Amp
MW	Megawatt
MWh	Megawatt Hour
MWp	Megawatt Peak
NamPower	Namibia Power Corporation (Proprietary) Limited
MRV	Maximum Recommended Values
NAPA	National Adaptation Programme of Action
NOx	Nitrous Oxide
NTS	Non-Technical Summary

Abbreviation	Definition
OCGTs	Open Cycle Gas Turbines
OECD	Organisation for Economic Co-operation and Development
OHS	Operational Health and Safety
OPEC	Organization of the Petroleum Exporting Countries
OPGW	Optical Ground Wire
OPHI	Oxford Poverty and Human Development Initiative
PAC	Project Affected Community
PAP	Project Affected Person
PM	Particulate Matter
PNAAC	National Climate Change Adaptation Plan
PNE	National Emissions Plan
PPE	Personal Protective Equipment
PRODEL	"Empresa Pública de Produção de Electricidade"
PS	Performance Standard
PV	Photovoltaic
RAI	Regional Area of Influence
RAP	Resettlement Action Plan
RCP	Representative Concentration Pathways
REPTUR	General Regulation on the Territorial, Urbanistic and Rural Plans
RNT	Rede Nacional de Transporte de Electricidade
RPF	Resettlement Policy Framework
RTE	Round Trip Efficiencies
RTT	Resettlement Task Team
SADC	South African Development Community
SARDB	South African Red Data Book
SAPP CC	Southern African Power Pool Co-ordination Centre
SCC	Social Cost of Carbon
SDG	Sustainable Development Goal
SEP	Stakeholder Engagement Plan
SFDRR	Sendai Framework for Disaster Risk Reduction
SFP	Strategy to Fight Poverty
SMHI	Swedish Meteorological Hydrological Institute
SPI	Standardised Precipitation Index
STD	Sexually-Transmitted Disease
SR	Scoping Report
SWAPO	South-West Africa People's Organization
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TB	Tuberculosis
ToR	Terms of Reference
TSS	Total Suspended Solids
TURH	Titles of Use of Water Resources
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNITA	National Union for the Total Independence of Angola
USD	United States Dollar
UXO	Unexploded Ordinance
VAC	Visual Absorption Capacity
VG	Vulnerable Group
VGP	Vulnerable Groups Plan
Vul	Vulnerable Species
W	Watts

Abbreviation	Definition
WB	World Bank
WCDRR	World Conference on Disaster Risk Reduction
WHO	World Health Organisation
WWTP	Waste Water Treatment Plant

1 Introduction

1.1 Initial considerations

This document represents the Environmental and Social Impact Assessment (ESIA)[1] Report for the Angolan portion of the Angola – Namibia Transmission Interconnector Project (ANNA). A separate report has been compiled for the Namibian part of the line. The complete Environment and Social Impact Assessment document is divided into three volumes: Volume I consists of the Non-Technical Summary (NTS), Volume II comprises this document, the ESIA Report, and Volume III constitutes the Environmental and Social Management Plan (ESMP).

The aim of the project is to alleviate the current electricity supply constraints and to contribute towards the security of energy supply by enhancing the distribution of electricity in the region. From its conception, the ANNA project has had the objective of promoting the highest positive economic, social and environmental impact possible whilst ensuring that all negative social and environmental impacts are addressed by avoiding negative impacts, or where they can't be avoided, minimising and compensating over and above the estimated impacts. This philosophy aims to ensure that the project attains a net positive social and environmental impact and contributes to the overall sustainable development of Angola and Namibia. These considerations were included in the initial conception of the project by means of selecting a route for the transmission line corridor that would avoid all identified sensitive environmental and social resources, as much as possible, as explained in Section 2.10.

The project is intended to link the Namibian and Angolan electricity networks in the north-western part of Namibia and in the southern part of Angola, initially supplying power to towns in the southern part of Angola, mainly Xangongo, Cahama and Ondjiva, as well as to provide for the future integration of 400 Kilovolt (kV) line(s) from the proposed Baynes Power Station[2]. Anticipated economic benefits include unlocking cheaper energy generation sources across the region, improved access to renewable energy sources (with lower emissions), reduced cost of transmission (due to an increase in transmission route options) and a reduced risk of supply interruptions to both countries. These objectives combined contribute towards the United Nations Development Programme (UNDP) Sustainable Development Goals (SDGs), as discussed in Section 3.3.4 and demonstrates progress towards the additional objective of climate co-benefits. The project design also included the applicable mitigation and adaptation measures, in order to minimise its vulnerability to climate change and increase its resilience.

The project is co-ordinated by the Southern African Power Pool Co-ordination Centre (SAPP CC) and has, as Project Sponsors/Proponents, Rede Nacional de Transporte de Electricidade (RNT) in Angola, and NamPower in Namibia.

The Southern African Power Pool Co-ordination Centre (SAPP CC) co-ordinates the planning, generation and transmission of electricity on behalf of member state utilities in the Southern African Development Community (SADC) region. As such, SAPP CC has identified the Angola-Namibia (ANNA) Transmission Interconnector Project as one of its key energy-pool initiatives.

The project is funded by the European Union (EU) and the funds are administered by the Development Bank of Southern Africa (DBSA). An ESIA is required to meet the international monetary lender standards for environmentally and socially sustainable development, and to meet national legal requirements. The separate ESIAs being undertaken for both the Namibian and Angolan sections of the proposed project are aligned with the DBSA Environmental and Social Safeguards Standards (closely linked to the Performance Standards of the International Finance Corporation – IFC), as well as with the country-specific legal requirements.

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[1] Although referred to as an ESIA process internationally, the terminology used in the Angolan legislation is Environmental Impact Assessment (EIA) process. In order to maintain consistency throughout this report, the term ESIA process will be used.
[2] Planned on the Kunene River downstream of Ruacana.

The procedure for the ESIA of the portion of the project within Angola, will comply with the local requirements, namely the Environmental Framework Law (Law no. 5/98, of 19 July), the Environmental Impact Assessment Decree (Decree no. 51/04, of 23 July), the Environmental Licensing Process (Decree no. 59/07, of 13 July), and further auxiliary legislation, as described in Section 3.1.1

The ESIA process in Angola is initiated by way of a project registration stage. This stage includes a screening phase in which the project's characteristics are assessed to evaluate whether any are included in the list of activities that require an Environmental Licence prior to any other licence. As per legal requirements in Angola, the next step after this initial stage is to submit an Environmental Impact Assessment (EIA) report to the Impact Assessment Authority (DNPAIA1) within the Environmental Ministry (MINAMB[2]) for consideration and approval. In Angola, the scoping phase is not included in the ESIA process. However, international best practice shows that the scoping stage of the assessment process forms a crucial part of stakeholder engagement, as well as helping to anticipate the identification of potential mitigation of potential negative impacts and the enhancement of expected positive project outcomes and, as such, scoping was included within the overall process.

A parallel report is being submitted to the Namibia Ministry of Environment and Tourism: Department of Environmental Affairs (MET: DEA) for review and approval of the section of the transmission line within Namibia.

The SAPP CC appointed Aurecon South Africa (Pty) Ltd (hereafter referred to as Aurecon) as an independent consulting firm to provide transaction advisory services and project scoping for the proposed project. This role includes undertaking the preliminary design, and the ESIA, of the preferred transmission corridor.

The proposed project is a 400 kV overhead transmission line, with a total length of approximately 362 kilometre (km) from the proposed Kunene substation in Namibia, to the proposed Lubango substation in Angola, of which 331 km will be located in southern Angola and the remaining 31 km in Namibia (Figure 1.1). The project is currently in the concept design phase. This ESIA report assesses a 2 km wide corridor for this total length (1 km on either side of the centreline of the proposed line), referred to as 'the study area'. The transmission line servitude of a maximum width of 55 m, within which the transmission line will be constructed, will be located within this 2 km wide corridor. The Namibian and Angolan sections of the line will be owned and operated by NamPower and RNT, respectively. A detailed project description is provided in Section 2.

The purpose of this ESIA Report (Volume II) is to present the project within its current context, describe the process and outcome of how the most suitable corridor was identified, present the assessment of the potential environmental and social impacts on the receiving environment, and provide mitigation and monitoring measures.

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[1] Direcção Nacional de Prevenção e Avaliação de Impactes Ambientais - National Direction for Prevention and Assessment of Environmental Impacts
[2] Ministério do Ambiente

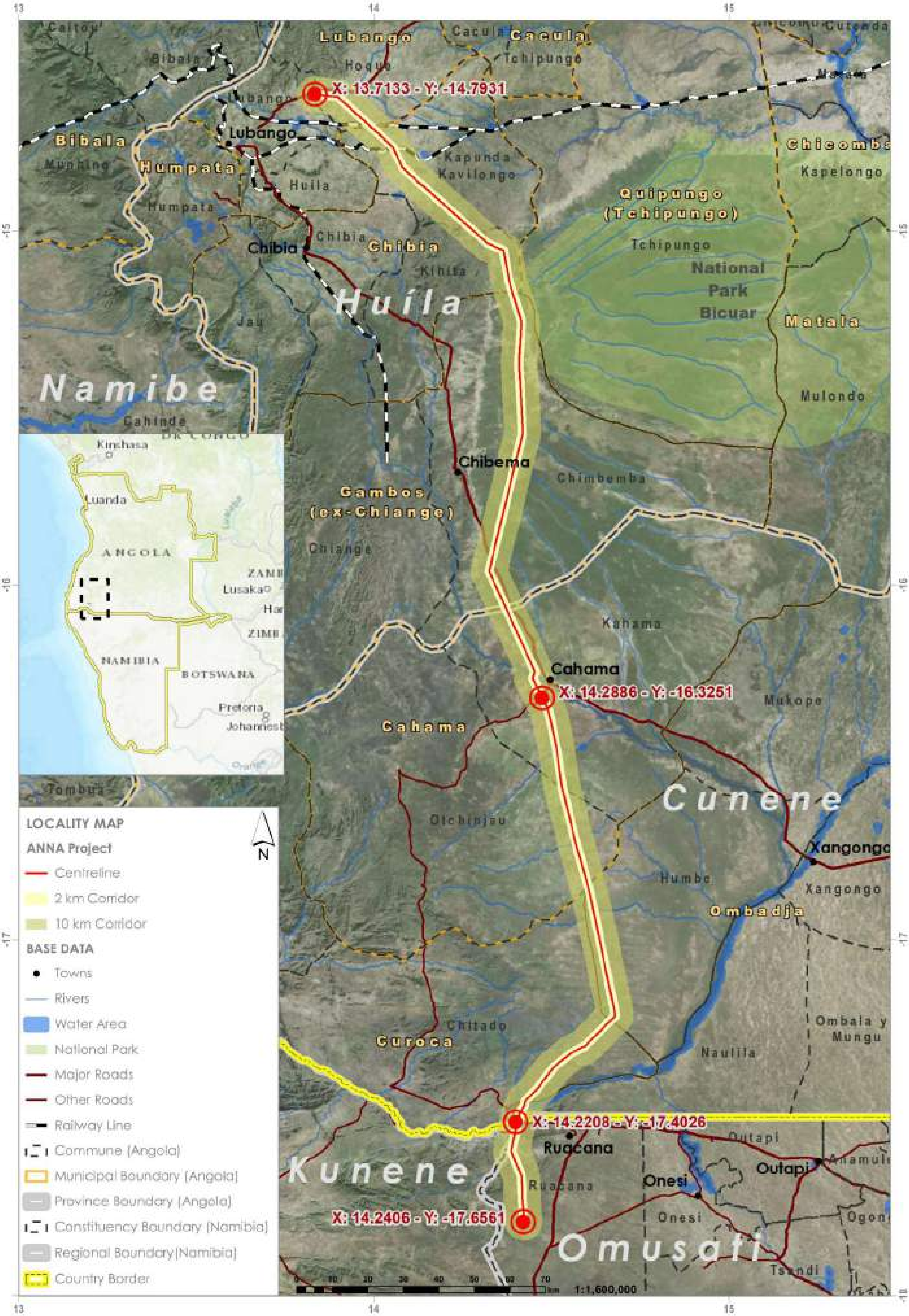

Figure 1.1: Locality map for the entire project

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1.2 Project Proponent and role players

The role players involved in the environmental licencing process are set out in Figure 1.2.

1.2.1 Key project role-players

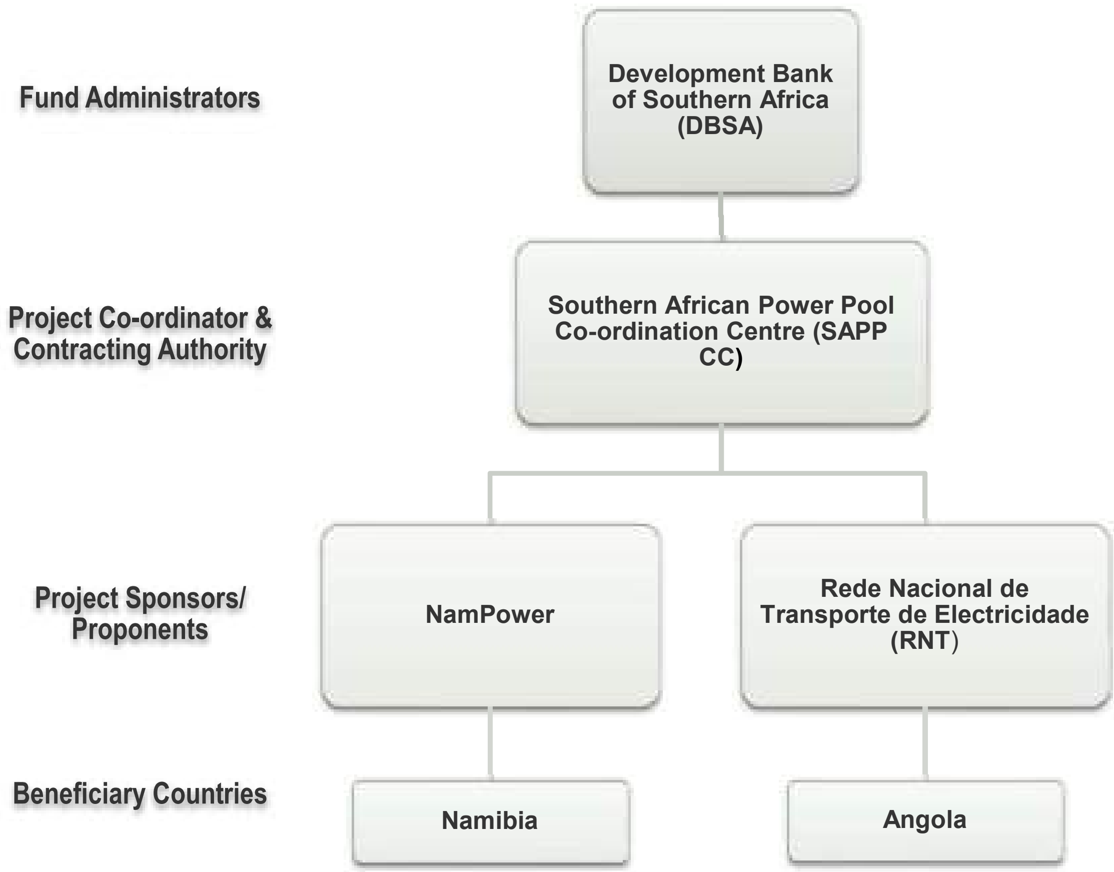


Figure 1.2: Project role players

1.2.2 Proponent

The SAPP CC has commissioned the ANNA Transmission Interconnector Project on behalf of the national electricity suppliers in Angola and Namibia, namely RNT and NamPower respectively. The details of the Angolan state utility are listed in Table 1.1.

Table 1.1: Details of the project Proponent in Angola

Company	Rede Nacional de Transporte de Electricidade (RNT)
Contact Person	Tárcio Cardoso
Address	RNT Luanda – Gaveto entre a Estrada da Camama e a Via Expressa
Telephone Number	+244 923 927 355
Email Address	tcardoso@rnt.co.ao

1.3 Environmental and social assessment team

The ESIA Report was co-ordinated by Aurecon, an environmental consultancy registered with the Angolan Ministry of Environment (MINAMB) (refer to Annexure A for the Environmental Consultant Certificate), and was developed by a multi-disciplinary team comprised of several technical experts with experience of similar studies and/or projects in the region (Table 1.2 and Table 1.3).

Table 1.2: Details of the ESIA co-ordination team

Role/Specialist Field	Consultant	Qualification	Company
Environmental Project Director	Stephan van den Berg	Geographer	Aurecon SA (Pty) Ltd
Senior Environmental Practitioner and Project Manager for Angolan section	Isabel Azevedo e Silva	Landscape Architect	Aurecon SA (Pty) Ltd
Technical Advisor	Patricia de Carvalho e Azevedo	Electrical Engineer	Aurecon Angola
Project Management Support for Angola	Sara Domingues	Geologist	Independent consultant
Project Management Support for Angola and Technical Translator	Nuno Ferreira	Environmental Engineer	Independent consultant

Table 1.3: Details of the ESIA support team

Role/Specialist Field	Consultant	Qualification	Company
Overall Project Director	Deon Vrey	Electrical Engineer	Aurecon SA (Pty) Ltd
Independent ESIA Reviewer and Advisor	Sean O'Beirne	Geographer	SE Solutions
Environmental Practitioner and Project Manager for Namibian section	Kirsten Jones	Environmental Scientist	Aurecon SA (Pty) Ltd
Environmental Practitioner and Quality Control of the ESIA documentation in English	Genie de Waal	Environmental Manager	Aurecon SA (Pty) Ltd
Environmental Project Manager	Reuben Heydenrych	Environmental Manager	Aurecon SA (Pty) Ltd
Environmental Practitioner and Technical Translator	Sara Domingues	Geologist	Independent consultant
Project Management Support for Angola and Technical Translator	Nuno Ferreira	Environmental Engineer	Independent consultant
Technical Translator	Catarina Henriques	Landscape Architect	Independent consultant
Environmental Practitioner and Support in compilation of ESMP	Franci Gresse	Conservation Ecologist	Aurecon SA (Pty) Ltd
Climate Change	Daniël Brink Dave Ogier Charissa da Costa	Disaster Risk Management Climate Scientist Geographer	AIVIA (Pty) Ltd AIVIA (Pty) Ltd Aurecon SA (Pty) Ltd
Geology and Water Resources	Pedro Duarte	Geologist	Independent consultant
Biodiversity (terrestrial and aquatic ecology and avifauna)	Peter Cunningham	Biologist	Environment & Wildlife Consulting (Pty) Ltd
Heritage	Stephan Gaigher	Archaeologist	G&A Heritage (Pty) Ltd
Social Aspects	Inês Mendes Georgios Xenakis	Geographer Electrical Engineer	Tese, Associação para o Desenvolvimento
Landscape/Visual	Isabel Azevedo e Silva Elmie Weideman	Landscape Architect Landscape Architect	Aurecon SA (Pty) Ltd Create Landscape Architecture and Consulting
Resettlement Policy Framework	Noeleen Greyling	Environmental Manager	Aurecon SA (Pty) Ltd
Stakeholder Engagement Plan	Noeleen Greyling Lynette Herbst Inês Mendes	Environmental Manager Environmental Manager Geographer	Aurecon SA (Pty) Ltd Aurecon SA (Pty) Ltd Tese
Vulnerable Group Plan	Inês Mendes	Geographer	Tese, Associação para o Desenvolvimento
Environmental Practitioner and Quality Control of ESMP	Patrick Killick	Environmental Manager	Aurecon SA (Pty) Ltd
Environmental Practitioner and Compilation of DSR	Kim White	Geographer	Aurecon SA (Pty) Ltd
Geographic Information System (GIS)	Cheryl Beuster Stephen Townsend	GIS Technician GIS Technician	Aurecon SA (Pty) Ltd

1.4 Objectives and general structure of the ESIA

The aim of the ESIA process is to identify and investigate potentially significant biophysical and socio-economic impacts, and to highlight any environmental dependencies and opportunities for adding environmental value, associated with the proposed project. Furthermore, and very importantly, the ESIA offers an opportunity for the public and key stakeholders to provide input and to participate in the process. This is to ensure that the end-design is grounded in sustainable development principles and can demonstrate the application of global good practice standards in promoting a sustainable economy across a region and, in particular, in promoting a sustainable and socially responsible energy sector that is responsive to global, regional and local pressures. Based on the specific nature of the potentially affected environment, specialist input has been sourced as required. The ESIA Report identifies mitigation measures to avoid or minimise the identified negative impacts, and to optimise the positive effects.

The ESIA process is iterative and has included a number of phases that have culminated in this ESIA Report. Figure 1.3 shows, in a simplified way, the several steps taken in the ESIA process thus far and, in Section 4.1, these are discussed in further detail. These steps include stakeholder engagement exercises that commenced during the Scoping Phase and which will continue throughout the ESIA process. This ESIA Report will be submitted to the Angolan Impact Assessment Authority (DNPAIA) for consideration and decision-making.

Upon receipt of stakeholder comments on the ESIA Report (Volumes I to III), which will only occur after submission of this Report to the DNPAIA as per Angolan legal requirements, all ESIA documentation, including the ESMP, will be updated, as these documents will also inform the detailed design and final alignment of the transmission line.

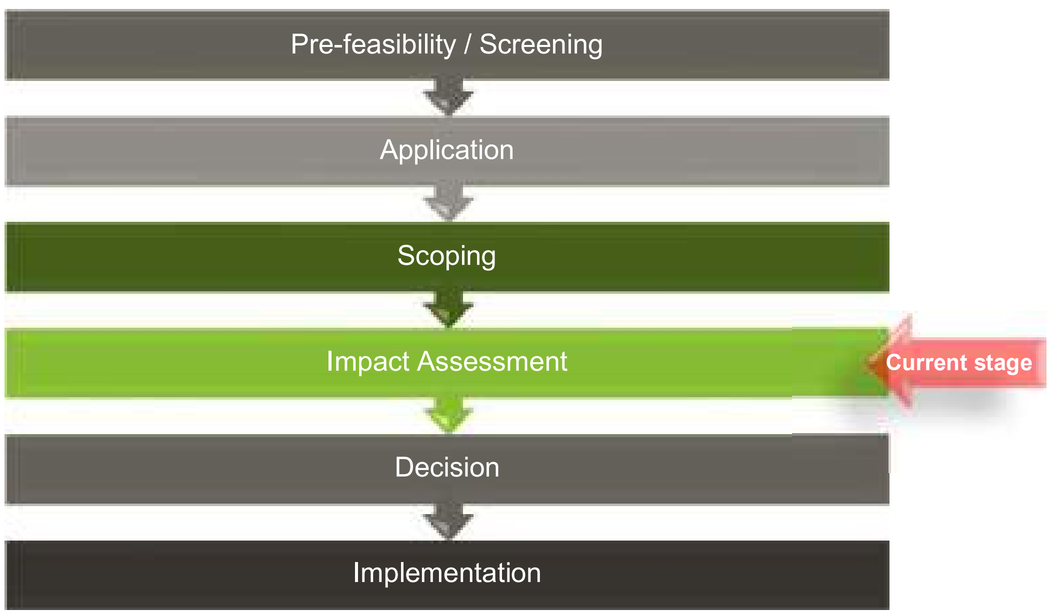


Figure 1.3: Simplified ESIA process followed in Angola

As previously mentioned, the ESIA Report includes an Environmental and Social Management Plan (ESMP - Volume III) to manage the environmental and social aspects through the lifecycle of the project. The ESMP, and associated documentation, comprises Volume III of the ESIA Report. The EIA process in Angola does not stipulate a requirement for an ESMP, as discussed in further detail in Section 4 and, as such, this document adheres to international guidance and best practice.

On completion of the ESIA process, the complete ESIA Report (Volume I to III) will be submitted to the DNPAIA. The findings of the ESIA process will inform DNPAIA's decision-making as to whether or not the project may proceed on social and environmental grounds. The findings of the ESIA process will also inform the detailed design and alignment of the transmission line within the 2 km wide assessed corridor.

In line with international standards/requirements, the DBSA Environmental and Social Safeguard Standards (DBSA, 2018) and the IFC Performance Standards (2012) have been applied to guide the contents of this Report. This ESIA Report (Vol. II) is divided into the following nine sections:

- **Section 1 – Introduction:** Introduces the project, provides a description of the various role players involved, presents the environmental and social team that co-operated in developing this Report, and sets out the purpose and structure of the document.
- **Section 2 – Project Description:** Explains the need for the proposed ANNA project and provides an overview of the Angolan component of the proposed project, including information on project design, as well as activities associated with its pre-construction, construction, operation and decommissioning phases.
- **Section 3 – Legal and Institutional Framework:** Describes the national, regional and international regulatory and policy framework for the ESIA process, relevant to the project.
- **Section 4 – ESIA Scope and Methodology:** Focusses on the ESIA methodology, detailing the phases of the ESIA and the approach that was followed. It also lists the assumptions and limitations associated with the development of the project and the ESIA, and provides a summary of the screening process that was undertaken for the project, as well as outlining the feasible project alternatives that have been considered. This section also provides a summary of the stakeholder engagement that has been conducted to date, and the grievance mechanism proposed for this stage of the project development.
- **Section 5 – Characteristics of the Environment:** Provides a description of the current state of the affected environment, divided into its physical, biotic and socio-economic aspects.
- **Section 6 – Potential Environmental and Social Impacts and Mitigation**: Provides the assessment of the impacts (positive and negative) likely to arise from the identified project activities, and the proposed mitigation and enhancement measures.
- **Section 7 - Environmental and Social Management of the Project**: Summarises the objectives and structure of the ESMP (Volume III).
- **Section 8 – Conclusions and Recommendations:** Summarises the project, provides a synopsis of the expected impacts, explains the No-Go alternative, synthesises the potential cumulative impacts, analyses the cross-cutting issues and the sustainability of the project in terms of the SDG, evaluates the project's compliance with the international safeguards, provides the conclusions and recommendations from the ESIA documentation and establishes the way forward for the ANNA Project.
- **Section 9 – Bibliography**: Lists the sources of information used in compiling this Report.

2 Project description

2.1 Project overview

The proposed project is the construction of a 400 kV overhead transmission line, with a total length of approximately 362 km, from the proposed Kunene substation in Namibia to the proposed Lubango substation in Angola.

The greatest section of the line will be within Angola, with only 31 km in Namibia between the Kunene River (the international border) and the proposed Kunene substation.

The project is currently in its Pre-feasibility Stage and there is therefore no detailed information on the location of its components, which will only be done in the project's detailed design stage. As mentioned earlier, at this stage of the project, the project's study area is a 2 km wide strip (i.e. 1 km on either side of the centreline of the proposed line).

2.2 Project location

The transmission line in Angola starts at the planned Lubango substation, north-east of the town of Lubango, from where it runs east for ± 6.5 km and then turns south-east for ± 65 km. The route then turns south-southwest, bypassing the Bicuar National Park, and runs for ± 93 km until it meets the Lubango-Cahama road, near Capanda, and follows its course for approximately 35.5 km until the line reaches Cahama. Near Cahama the line turns in a westerly direction to reach the proposed Cahama substation. After the Cahama substation, the transmission line runs in a south-easterly direction for ± 91 km and then south-west for another ± 40 km, whereafter it reaches the Namibian border.

The proposed stretch of transmission line in Namibia is expected to run parallel to, and to the east of, the existing 330 kV transmission line, which runs from Omburu to Ruacana, as well as the existing 66 kV transmission line that runs north from Ruacana. The proposed 400 kV line would be offset by 60 m from these existing lines.

The study area for the ESIA is a 2 km wide strip (i.e. 1 km on either side of the centreline of the proposed line) to ensure sufficient coverage for anticipated design changes, and to allow some flexibility for micro-siting at later stages of the project. However, the transmission line will only be constructed within a 55 m wide servitude within the 2 km assessment corridor. It is estimated that a 12 m width within the servitude will need to be totally cleared of vegetation and obstacles to create a service road and to ensure that the line has sufficient clearance from vegetation.

2.3 Project need and desirability

The project's need and desirability has been considered in the light of the objectives and goals of SAPP CC and RNT. The project's business case is summarised below, giving an overview of the considerations for feasibility, which influences the need and desirability. Thereafter, the societal benefits of the project are discussed.

As stated in the introduction, the aim of ANNA Project is to alleviate the current electricity supply constraints and to contribute towards the security of energy supply by enhancing the distribution of electricity in the region. This project was conceived from its start with the objective of promoting the highest positive economic, social and environmental impact possible, ensuring that all negative social and environmental impacts are addressed by avoiding negative impacts, or where they can't be avoided, minimising and compensating over and above the estimated impacts. This philosophy aims to ensure that the project attains a net positive social and environmental impact and contributes to the overall sustainable development of Angola and Namibia.

These objectives combined contribute towards the United Nations Development Programme (UNDP) Sustainable Development Goals (SDGs), as discussed in Section 3.3.4 and demonstrates progress towards the additional objective of climate co-benefits. The project design also included the applicable mitigation and adaptation measures, in order to minimise its vulnerability to climate change and increase its resilience (Section 2.3.3)

2.3.1 Role of electrical grids and interconnectors

Electricity is the flow of electrons through a conductor, like a wire, and the concept of water travelling through a pipe is a useful analogy. The electrical grid forms the connections between electrical suppliers and consumers through interconnected networks, and includes generation, transmission and distribution components. Power, measured in Watts (W), is generated at a plant (such as a hydropower plant). Voltage is the electromotive force, based on the potential difference in charge between two points in an electrical field, much like water pressure. The power generated at the power station is stepped up to a high voltage (400 or 330 kV[1] by the utility, e.g. RNT) to transmit it over long distances with minimum losses. Amps are the electrical unit for current and can be compared to the flow rate of water. The high voltage of the power reaching the demand centres is stepped down at a substation, from 400 or 330 kV, to 132 kV and 11 kV, for distribution to individual customers, and can be managed by a distributor (such as the National Electricity Distribution Company - ENDE[2]), before it is stepped down even further to a suitable service voltage.

Electrical grids are designed to have built-in redundancy, which is the provision of a number of redundant connections that can be used as alternative pathways in the case of any equipment failures, or the de-energizing of lines for maintenance. The grid is constantly changing in response to the sources of generation (e.g. solar and wind only in certain conditions, coal and hydro as an available baseload which can be activated when required), and demand. It is essential that the supply be maintained, to prevent damage to the infrastructure when demand increases so as to avoid tripping or power outages. Therefore, for a country to maintain economic growth, the electrical grid should be able to support the electrical demand as required at any given time.

Electrical grids within a region are often connected via interconnectors (high voltage lines connecting the grids of different countries), providing for economies of scale and allowing energy to be purchased from large, efficient sources. Currently, utilities such as RNT, can draw power from generators in different countries within the Southern African Power Pool (SADC region) to ensure continuous and reliable power. Interconnection also allows countries to have access to least-cost energy, generated from different sources in neighbouring countries. For example, one country may be producing cheap hydropower during wet seasons, but in dry seasons another country may be producing cheaper power through wind and solar, allowing these countries to access cheaper energy sources from one another during different times of the year. This flexibility of mixing and matching different electricity sources will be key to allowing greater access to renewable energy, especially the substantial hydro-electric sources along the Kwanza River in Angola. These benefits will accrue not only to Angola and Namibia, but also to other countries in the SAPP grid, since the flow of electricity between these two countries could also be shared with other countries that form part of the regional grid.

It is anticipated that the future electrical grid will be decentralised, with renewable generation sources being located closer to the demand/customers. This will reduce the losses associated with long transmission lines and will also facilitate higher penetration of the mini-grids powered by renewable energy. The increasing development of battery energy storage is one of the catalysts for the decentralised and mini grids.

The objective of the ANNA interconnector project is focussed on facilitating a broader range of supply options that may be more economical and more reliable. In addition, it will provide the transmission infrastructure to southern Angola, thus facilitating electrification of customers who are not currently connected to the grid and eliminating the need to use diesel generators and other non-renewable energy sources that contribute to climate change.

[1] 1kV = 1,000 V

[2] Empresa Nacional de Distribuição de Electricidade

2.3.2 Overview of the Business Case

A summary of the Business Case for the project is provided below, giving an overview of the issues considered to establish feasibility, as well as need and desirability.

A feasibility study was undertaken for this project, which included an analysis of its viability to determine whether to proceed. The process consisted of a series of structured steps intended to demonstrate the feasibility of the ANNA interconnector project, underpinned by a series of technical studies that further informed, and enabled a decision on, the feasibility of the project. One of these studies is the Business Case, which provides quantitative financial, and quantitative and qualitative economic, justifications of the interconnector investment decision.

In the case of transmission interconnector projects, consideration is given to direct and indirect benefits, such as revenues from trade, increased security of supply, access to cheaper power that leads to reduced electricity prices, reduced curtailment of renewable energy generation options due to increased grid stability, and indirect environmental benefits. The location and purpose of the interconnector, the regulatory regime and the nature of the electricity market, all inform the possible suite of potential benefits of a specific interconnector. Thus, the business case for a transmission interconnector must be developed within the specific context and landscape into which it is proposed to be located.

The approach adopted for the development of the business case for the ANNA interconnector was based on the creation of multiple scenarios that reflect potentially-valid futures for the broader SAPP landscape, which reduces the level of uncertainty and provides for a number of potentially-valid views of the future. Figure 2.1 depicts the six scenarios that are described in Table 2.1. It is evident that the scenarios account for uncertainty with regards to climate variability. However, more detail on this is provided in Section 2.3.3.

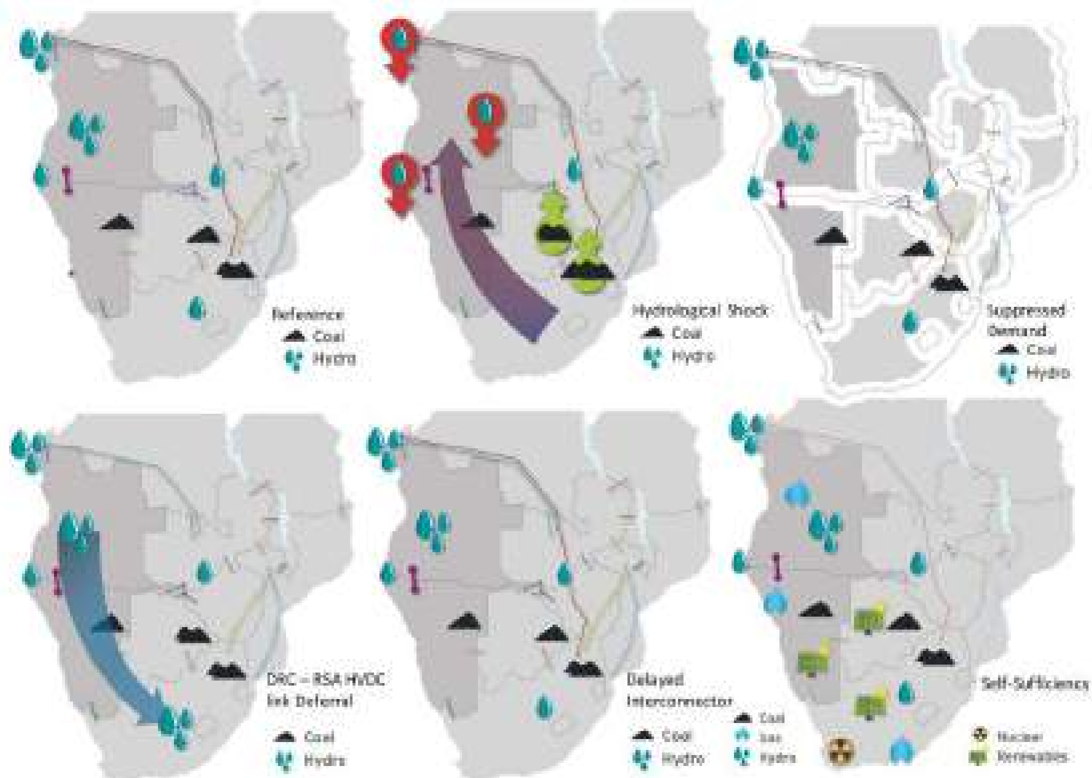


Figure 2.1: Future ANNA scenarios

Table 2.1: Summary of future scenarios

Scenario	Description
Reference	Applies the respective utilities' generation aspirations, as articulated within the SAPP 2017 Masterplan Component A, with the exception of Angola and Namibia.
Hydrological shock (dry season)	This scenario assumes a dry season and its impact on the hydro-power plants. The hydro-power plants' capacity factor is reduced. The northern countries will be impacted more, as they are heavily reliant on hydro-power, as opposed to the southern countries that are more reliant on coal. The capacity of the coal power plants is increased to compensate for the reduction of power output of the hydro-power plants. This scenario assesses if the ANNA line brings any benefit to alleviate the hydrological shock impact.
Eskom hydro import via AC technology	South Africa's Integrated Resource Plan (IRP) makes provision for importing additional hydro-power. This scenario assesses if the ANNA interconnector can facilitate the import of hydro if the more expensive High Voltage Direct Current (HVDC) link from Democratic Republic of the Congo (DRC) to South Africa is delayed.
Delayed interconnector	This scenario assesses the benefit for ANNA if the other planned interconnectors are delayed by 3 years from the anticipated commissioning dates.
Self-sufficiency	This scenario is the same as the reference scenario, except that a reserve margin of 10% firm was imposed in all countries, where only domestic firm generation capacity (i.e. excluding photovoltaic, wind and cross-border interconnectors) can contribute to the reserve.
Suppressed demand	This scenario is the same as the reference scenario, except that in all countries demand (energy and peak) is reduced by 10% in all years. The objective of this scenario is to assess if there will be any flows on ANNA (financial and economic benefit) if the region experiences a suppressed economic growth.

One of the considerations is the aspirations of both Namibia and Angola, and their respective strategies for the energy sector. These are discussed in more detail in Section 2.3.4.1.

In establishing a business case, the following attributes were considered (Table 2.2).

Table 2.2: Business Case attributes for the project

Attribute	Description
Energy import, export and wheeling	The interconnector would allow for an increase in the purchase and sale of excess energy and capacity across the border, and associated wheeling across both Namibia and Angola, i.e. revenue from energy import/export/wheeling activity.
Generation cost reduction	The interconnector would allow for power to be imported to meet required demand. The demand would alternatively have had to be met through the use of more expensive generation sources or the development of additional generation capacity. Thus, ANNA provides a mechanism to avoid the use of these expensive generation sources or defer the capital expenditure for new generation capacity.
Energy security	Security of supply can be defined as the ability of the power system to provide adequate and secure electricity during normal operating conditions and under specific contingencies. The potential value proposition of the interconnector relating to energy security can be calculated in terms of the cost of unserved energy, or the cost of alternatives to provide the security, such as the typically higher operating cost of open cycle gas turbines (OCGTs) or diesel generators.
Environmental benefits	Indirect environmental benefits could potentially be realised as a result of: • Potential increased hydro-power from the Kwanza River and the additional path for hydro-power in DRC. • Potential increased renewable energy penetration due to cross-border renewable energy trading. • Potential increased renewable energy penetration due to increased energy system stability. • Potential reduced need for spinning reserves (typically from carbon-based generators) as back-up for intermittent generation, due to increased energy security. • A resultant benefit of reduced Carbon Dioxide (CO_2) emissions in the region.
Strategic objectives	The development of the ANNA interconnection is informed by the broader SAPP network objectives of increasing power transfers, improving stability and reliability and facilitating trading, among others and, to this end, how ANNA can potentially serve to create a key link in the transmission interconnection development process.

Attribute	Description
	Sponsors have other specific objectives beyond the SAPP objectives. The purpose of this attribute is to evaluate if the ANNA project outcomes address these objectives.

The trading potential of the ANNA Project has been calculated for each of the scenarios (Table 2.1) and presented in Table 2.3, which shows that the line will be used to different degrees in each scenario and demonstrates the business case for each eventuality.

Table 2.3: Trading potential of ANNA scenarios

	Trading potential of ANNA	
Scenarios	**ANNA utilisation (%)**	**Average energy flow (GWh)**
Reference	53%	3,217
Hydrological Shock	53%	3,236
Eskom Hydro Import	66%	3,996
Delayed Interconnector	27%	1,646
Self Sufficiency	39%	2,390
Suppressed Demand	52%	3,166

2.3.3 Climate change considerations

To prevent the most severe impacts of climate change, parties to the UN Framework Convention on Climate Change (UNFCCC) agreed to a target of keeping the rise in average global temperature since pre-industrial times below 2°C, and to consider lowering the target to 1.5°C in the near future.

However, even if emissions are halted immediately, temperatures will remain elevated for centuries due to the effect of greenhouse gases from past human emissions already present in the atmosphere.

A progressive temperature increase, an increasing number and severity of extreme weather events and changing precipitation patterns will affect energy production and delivery and will impact on renewable and non-renewable energy generation.

Significant cuts in GHG emissions from energy production can be achieved through a variety of measures, including cutting emissions from fossil fuel extraction and conversion, switching to lower-carbon fuels, improving energy efficiency in transmission and distribution, increasing use of renewable and nuclear generation, introduction of carbon capture and storage (CCS), and reducing final energy demand. This will mean a fundamental transformation of the energy sector worldwide in the next few decades.

Although thermal power plants are designed to operate under diverse climatic conditions, they will be affected by the decreasing efficiency of thermal conversion due to rising ambient temperatures and potential reduced availability of cooling water. Changing regional weather patterns are also likely to affect the hydrological cycle that underpins hydro-power generation and provides cooling water for thermal generation. This can be either due to an increase or decrease in rainfall patterns. An anticipated increase in cloudiness in some regions would affect solar technologies, while an increase in the number and severity of storms could affect output and damage to wind turbine equipment and cause damage to transmission infrastructure.

The ANNA Business Case is based on the creation of multiple scenarios that reflect potentially valid generation and supply futures for the broader SAPP landscape, as described in Section 2.3.1 above. This development is generic in nature and, although it resembles most of the future generation and supply options, it did not specifically consider climate change scenarios. One such scenario could consider a significant reduction in thermal generation, changing regional hydrological patterns (other than just a hydrological shock) and an increase in renewable energy (with and without an increase in intermittence due to weather conditions). This scenario could potentially result in a significant decrease in actual energy transfer between the countries.

Despite this potential impact on energy transfer, one of the objectives for developing the ANNA interconnector is to enable regional trade, resulting in security and stability benefits, and allowing the transportation of variable and intermittent energy sources to dynamically affected demand points.

2.3.3.1 Impact of climate change on the regional energy sector

A high-level assessment of this scenario has been conducted as part of the ANNA ESIA. Models have indicated that the following energy scenarios are likely, based on current climate trends (refer to Section 5.2.1 for more project-specific scenarios):

- Mean annual temperature rise over Africa, by 2°C come mid-century and as high as 4°C by the end of the century. This will place severe strain on agricultural sectors and may force farmers to utilise more artificial techniques (increasing energy demand).
- Larger variation in mean rainfall over the entire continent – extreme periods of rainfall resulting in flash flooding (compromising agriculture) and prolonged periods of limited rainfall. This compromises water security.
- Increase in greenhouse gases (GHGs), leading to accelerated ocean acidification – placing strain on economies that are to some degree dependent on the fishing industry. This will, in all likelihood, shift focus to other industries, increasing overall energy demand.

In terms of impact on the energy sector, electrical generation will be the first area affected, as follows:

- Pressure to decommission thermal power plants due to operational unfeasibility (carbon tax and ageing infrastructure). This will result in a reduction in grid inertial response.
- Increased renewable energy penetration will take place. The impact of this will be an increase in variable generation.
- Hydro-power availability will fluctuate with a resulting fluctuation and availability of inertial response.

Without climate change planning, the power generation landscape below (Figure 2.2) reflects the future Southern Africa scenario.

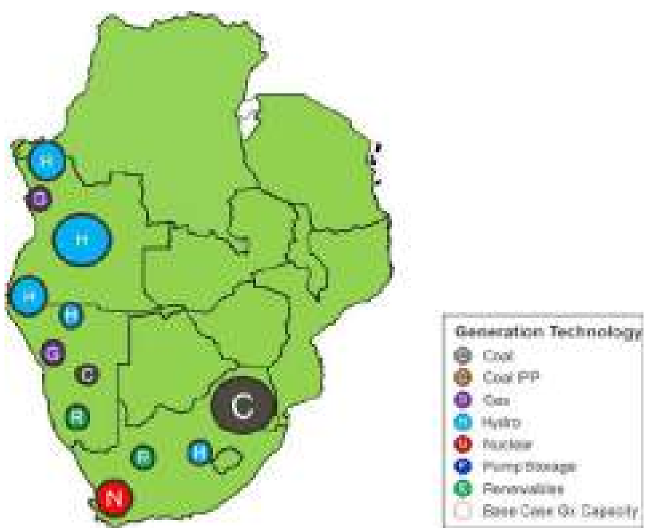


Figure 2.2: Generation Schedule - base

Accounting for climate change planning, as informed by the Intergovernmental Panel on Climate Change (IPCC) models, the following generation schedule reflects potential generation scenarios within Southern Africa (Figure 2.3).

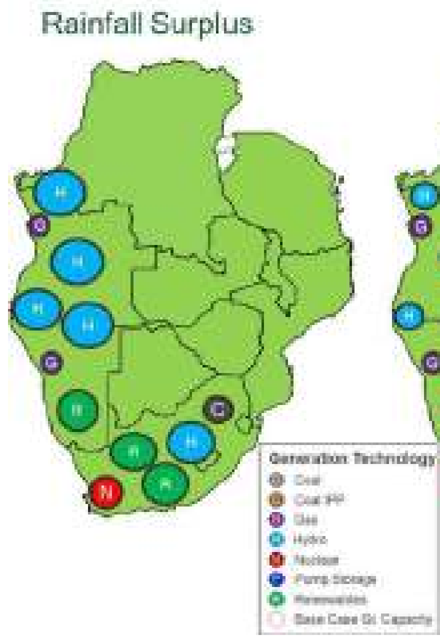


Figure 2.3: Generation Schedule - climate change effect

The power generated by hydro-power plants is affected by the flow rate, hence the following would occur:

1. With reduced rainfall, the river flow rate will decrease, which will reduce the hydro-power plant output. Furthermore, the output rate will have to be further reduced to prevent depletion of reservoir volume.
2. Conversely, with periods of extreme rainfall, the river flow rate will be increased, which will increase the output of the hydro-power plant. Furthermore, the output rate will have to be further increased to prevent an unfeasible surplus in reservoir volume.

The direct effect of the above is a potential reduction in inertial capacity which is critical for power system stability within the Southern Africa context. The effects include the following:

1. Frequency instability due to reduced inertial capacity (decommissioning of thermal plants and reduced hydro capacity in times of water shortage).
2. In cases of hydro surplus, voltage instability (voltage profile collapse) due to increased power flow.

In situations such as these, new technology, as described below, is recommended.

- Virtual Inertia for frequency stability – control algorithms to allow a renewable energy plant without a synchronous generator to achieve critical quantum of energy to provide frequency support.
- Flexible AC transmission systems (FACTS) for reactive power support and subsequent enhanced voltage control.
- Climate change planning to be incorporated in all developmental plans, where detailed studies will facilitate better understanding of climate change mitigation.

2.3.3.2 The impact of ANNA on climate change within the region

The regional CO_2 emission reduction due to access to renewable energy sources and decommissioning of coal fired power plants was modelled and assessed within each of the ANNA scenarios, also shown in Table 2.4.

The simulated emissions per scenario is shown in Table 2.4. Two scenarios, the Delayed Interconnector as well as the Self Sufficiency scenario show an increase in annual emissions based on change in the ANNA utilisation and trading potential, while the remaining scenarios show a decrease in CO_2 emissions of between 886 and 34,778 kilo Ton over the study period (mid-century), which is favourable for the region.

Table 2.4: The 2025 to 2040 CO_2 emissions (kT)

Scenarios	CO2 Emission (kT)
Reference	(8,492)
Hydrological Shock	(886)
Eskom Hydro Import	(34,778)
Delayed Interconnector	23,181
Self Sufficiency	17,990
Suppressed Demand	(18,916)

Figure 2.4 shows the simulated increase or reduction of CO_2 emissions per scenario over time for the study period.

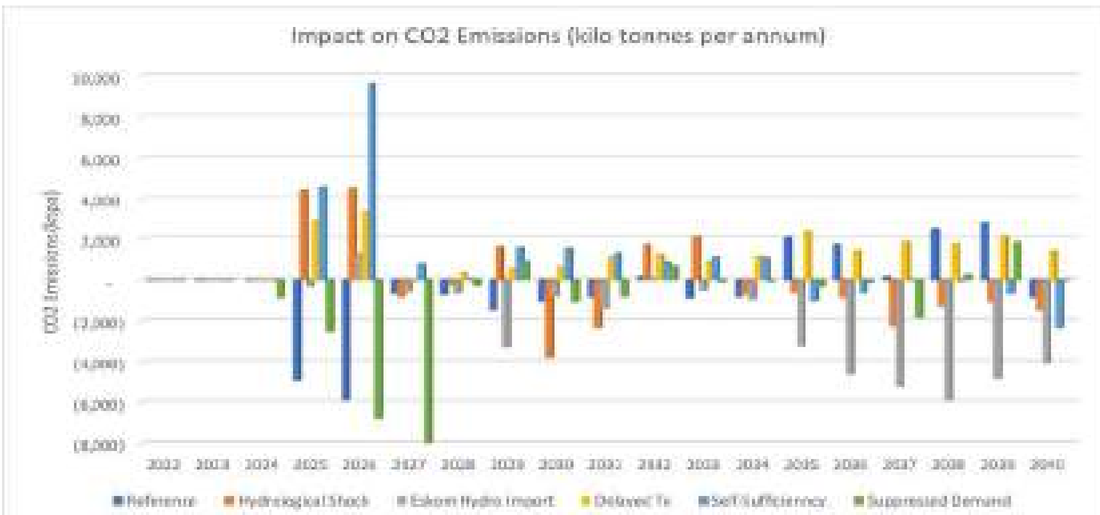


Figure 2.4: CO2 emissions per scenario (kT)

2.3.4 Strategic objectives

Whilst SAPP CC has a regional focus on electrification and energy trading in southern Africa, RNT (and NamPower) are committed to national energy aspirations. This is evident in their respective objectives. Specific objectives of each party, for the project, was workshopped during the development of the Business Case and are presented in Table 2.5.

2.3.4.1 Project objectives

Table 2.5: Objectives for the ANNA Interconnector Project

SAPP CC	NamPower	RNT
Interconnect the Angolan and Namibian power systems	Access to greater SAPP market	Connect to SAPP market
Complement other regional supply initiatives by increasing the power transfers within the SAPP network	Trading of excess renewable energy	Integration of proposed Baynes Hydro-power Project

SAPP CC	NamPower	RNT
Increase stability in the power pool through additional interconnection between the strong versus weak networks	Potential (additional) wheeling [1] and reduced transmission cost	Electrification of the southern part of Angola
Improve system control, adequacy and reliability of power supply	Integration of proposed Baynes Hydro-power Project	Trading (export/import/wheeling) opportunities in SAPP
Deepen regional integration that will facilitate improved electricity trading	Energy security	Energy security

In addition, throughout the process the utilities and SAPP CC have agreed that the project should also achieve the additional objective of climate co-benefits. This has been achieved in principle, as demonstrated in Section 2.3.5.

2.3.4.2 National energy objectives

The "Angola Energy 2025 – Angola Power Sector Long Term Vision" (MINEA, 2016) assesses the main long term options, and establishes the Government's atlas and vision for development of the electricity sector in the 2018-2025 horizon, identifying priority investments in generation, transmission and interconnection, as well as distribution and network expansion.

The 2025 Power Sector Vision anticipates that demand will see significant growth, based on an electrification process focussed on provincial capitals, municipal and communal urban areas, whenever economic and technical rationale allow it. As such, priority will be given to grid extension to maximise the number of municipal and communal urban areas and the continued investment in structural projects in the interconnected grid.

"I*n order to ensure a safe power supply, even in years of lower hydro flow, Angola should have 9.9 Gigawatt (GW) of installed capacity – through increasing power capacity in all sub-systems and through a strong reliance on hydro and gas (which will correspond, respectively, to 66% and 19% of installed power capacity).*

Angola will achieve more than 70% of installed renewable capacity – one of the highest percentages in the world – which includes 800 Megawatt (MW) of new renewables (biomass, solar, wind and mini-hydro). Angola will thus be on a level playing field with the best 10 countries in the world in SADC, Organization of the Petroleum Exporting Countries (OPEC) and Organisation for Economic Co-operation and Development (OECD), with regards to installed renewable power and CO_2 power sector related emissions.

Generation dispatch will depend greatly on hydrology. In favourable years hydro will represent more than 70% of internal consumption. Gas production will also serve exports, and the remaining thermal will be used only as a backup (representing less than 1% of the generation). In dry years, hydro will account only for 48% of production, gas power stations will be fully functioning for internal consumption, there will be a high utilization of the remaining thermal backup units and it may be necessary to import energy in off-peak hours. Maintaining supply security requirements, Angola may export energy in wet periods and import during off-peak hours in dry periods.

The National Transmission Network will continue to expand after 2017, with the goal of interlinking all provincial capitals, of taking the power grid to an ever-increasing number of municipalities and townships, of maximizing generation efficiency and of promoting Angola's interconnection to the regional system of SADC. The North-Central-South transport corridor will provide provinces with competitive energy and enhanced supply security, connect the Angolan power system to DR Congo (in the north) and Namibia (in

[1] Wheeling is the transfer of electrical power through transmission and distribution lines from one utility's service area to another. Utilities levy wheeling charges to other utilities who trade electricity across their network. Who pays the wheeling charges? For example, Angola sells power to South Africa and wheels power through Namibia's Network. South Africa pays Angola for the sale of energy. South Africa pays Namibia wheeling charges for the use of its network.

the south) and, after 2025, allow the transport of gas-based generation from new gas discoveries." (MINEA, 2016)

The Angolan transmission network is owned and operated by RNT. The existing transmission network is operated as three isolated transmission grids, namely the Northern, the Central and the Southern grids. The majority (two-thirds) of the connected demand is located in the Northern Region, where the Luanda province is located. Currently in Luanda, there is a significant demand that is supplied through privately-owned diesel generators, due to a number of reasons. Should these loads be connected to the Northern Region, demand will increase substantially (Table 2.6).Table 2.6 and Figure 2.5 show Angola's electricity demand growing from ~1 877 MW in 2015, to 7 199 MW in 2030.

Table 2.6: Angola's Electricity demand forecast

Regions	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Northern	1307	1445	1592	1744	1900	2062	2228	2400	2576	2758	2944	3121	3251	3387	3528	3675
Central	299	342	434	553	656	781	886	1003	1139	1269	1405	1503	1566	1632	1700	1771
Southern	161	204	345	418	477	531	587	646	709	775	845	904	942	981	1022	1065
Eastern	111	116	162	253	300	343	404	449	485	524	565	584	609	634	661	688
Total [MW]	**1877**	**2106**	**2533**	**2968**	**3333**	**3717**	**4105**	**4498**	**4909**	**5326**	**5759**	**6113**	**6368**	**6634**	**6911**	**7199**

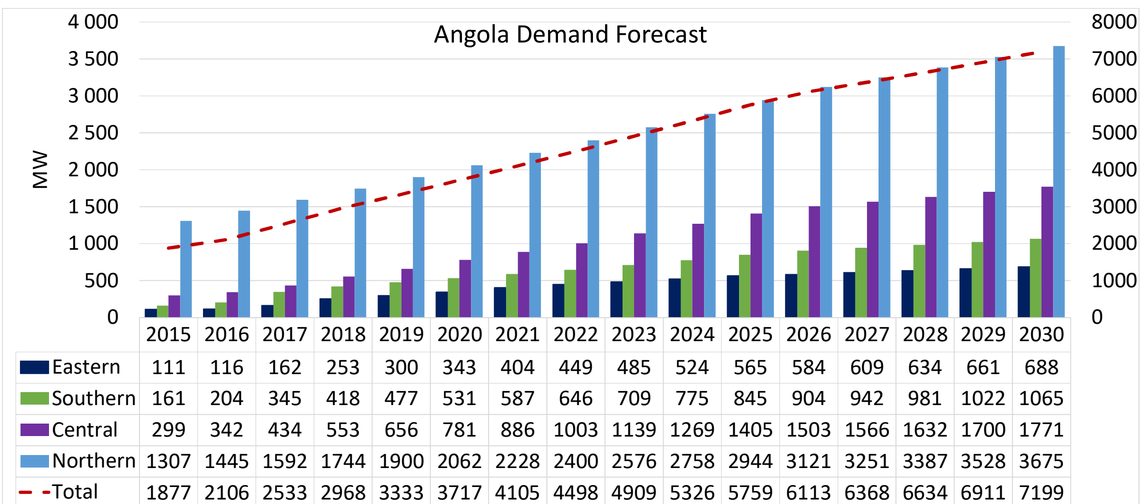


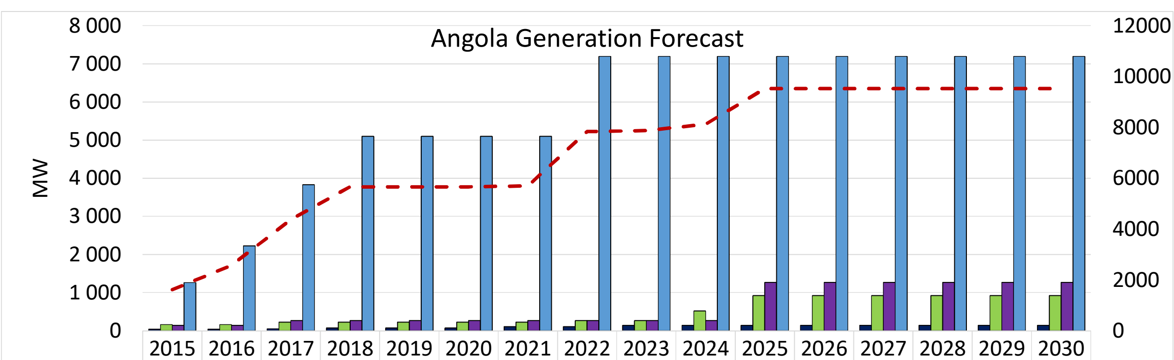
Figure 2.5: Angola's electricity demand forecast

The Angolan electricity generation is primarily provided by diesel, gas and hydro sources. Historically, diesel dominated as Angola's power generation source, with a shift to hydro in recent years. The installed generation capacity within Angola is envisaged to grow from 2 570 MW in 2016, to 9 500 MW in 2025 and beyond (Table 2.7), and the Northern Region has a significant generation potential, mainly due to the hydro-power plants planned for the Kwanza River (Figure 2.6).

Table 2.7: Angolan planned generation projects (MW)

Baseline Scenario	Region	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Existing Gx	Northern	1265	1265	1265	1265	1265	1265	1265	1265	1265	1265	1265	1265	1265	1265	1265	1265
Existing Gx	Central	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143
Existing Gx	Southern	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164
Existing Gx	Eastern	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
Camama	Northern	0	0	50	50	50	50	50	50	50	50	50	50	50	50	50	50

Baseline Scenario	Region	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Morro Bento	Northern	0	0	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Soyo	Northern	0	0	500	700	700	700	700	700	700	700	700	700	700	700	700	700
Jamba – Ya – Oma	Southern	0	0	0	0	0	0	0	0	0	75	75	75	75	75	75	75
Jamba – Ya – Mina	Southern	0	0	0	0	0	0	0	0	0	180	180	180	180	180	180	180
Matala	Southern	0	0	0	0	0	0	0	40.8	40.8	40.8	40.8	40.8	40.8	40.8	40.8	40.8
Lubango	Southern	0	0	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Tômbwa	Southern	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100
Namibe	Southern	0	0	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Dango	Central	0	0	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Quileva	Central	0	0	75	75	75	75	75	75	75	75	75	75	75	75	75	75
Laúca	Northern	0	0	1002	2071	2071	2071	2071	2071	2071	2071	2071	2071	2071	2071	2071	2071
Caculo Cabaça	Northern	0	0	0	0	0	0	0	2100	2100	2100	2100	2100	2100	2100	2100	2100
Baynes (*)	Southern	0	0	0	0	0	0	0	0	0	0	300	300	300	300	300	300
Luachimo	Eastern	0	0	0	0	0	0	36	36	36	36	36	36	36	36	36	36
Saurimo	Eastern	0	0	0	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
Chicapa	Eastern	0	0	0	0	0	0	0	0	34	34	34	34	34	34	34	34
Chiumbue Dala	Eastern	0	0	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Keve	Central	0	0	0	0	0	0	0	0	0	0	1000	1000	1000	1000	1000	1000
Cambambe 1	Northern	0	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260
Cambambe 2	Northern	0	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
Total Generation		**1613**	**2573**	**4372**	**5661**	**5661**	**5661**	**5697**	**7837**	**7871**	**8126**	**9526**	**9526**	**9526**	**9526**	**9526**	**9526**
Demand (Extrp'd)		**1877**	**2106**	**2533**	**2968**	**3333**	**3717**	**4105**	**4498**	**4909**	**5327**	**5759**	**6113**	**6368**	**6634**	**6911**	**7199**



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Eastern	41	41	53	73	73	73	109	109	143	143	143	143	143	143	143	143
Southern	164	164	224	224	224	224	224	265	265	520	920	920	920	920	920	920
Central	143	143	268	268	268	268	268	268	268	268	1268	1268	1268	1268	1268	1268
Northern	1265	2225	3827	5096	5096	5096	5096	7196	7196	7196	7196	7196	7196	7196	7196	7196
Total	1613	2573	4372	5661	5661	5661	5697	7837	7871	8126	9526	9526	9526	9526	9526	9526

Figure 2.6: Angolan electricity generation forecast per Region

The overall demand/supply for Angola indicates a greater installed generation capacity (MW) than the envisaged peak demand, from 2017 and beyond, as shown in Figure 2.7.

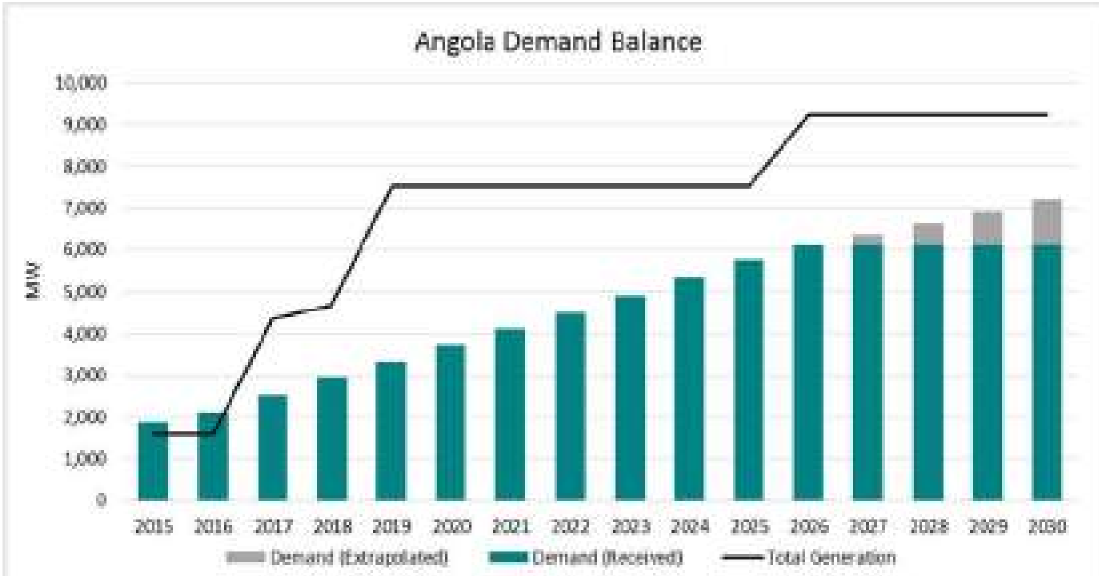


Figure 2.7: Angolan overall demand vs supply

However, this excess generation capacity is concentrated in the Northern Region (generation potential on the Kwanza River). The Northern Region is envisaged to have an excess capacity of >3 200 MW beyond 2025, and the Eastern, Central and Southern Regions will have a generation deficit of >500 MW, >500 MW and 150 MW respectively. Furthermore, if the Baynes hydro-power station is not developed, the generation deficit in the Southern Region will increase to 450 MW. Thus, Angola has the potential to trade (export) ~2 000 MW with SAPP member utilities.

Interconnection projects are important and are required to meet the objective of expanding electricity supply capacity in the SADC region. Interconnector projects also enhance availability and reliability of electricity supply in the respective countries, and facilitate electricity trade in the SAPP.

The development of the ANNA interconnection project is informed by the SAPP network objectives of increasing power transfers, improving stability and reliability, and facilitating trading, among others, as well as how the proposed ANNA project can potentially serve to create a key link in the transmission interconnection development process. The ANNA project is further viewed as a priority project for SAPP CC, given that this project serves to interconnect Angola, as a non-operating member, into the SAPP grid.

Thus, the ANNA project will assist with the supply of electricity for the increasing future demand for electricity in Namibia, and strengthen and expand the transmission of electricity in Southern Africa, particularly to facilitate Angola's trade with the entire SAPP (Figure 2.8).

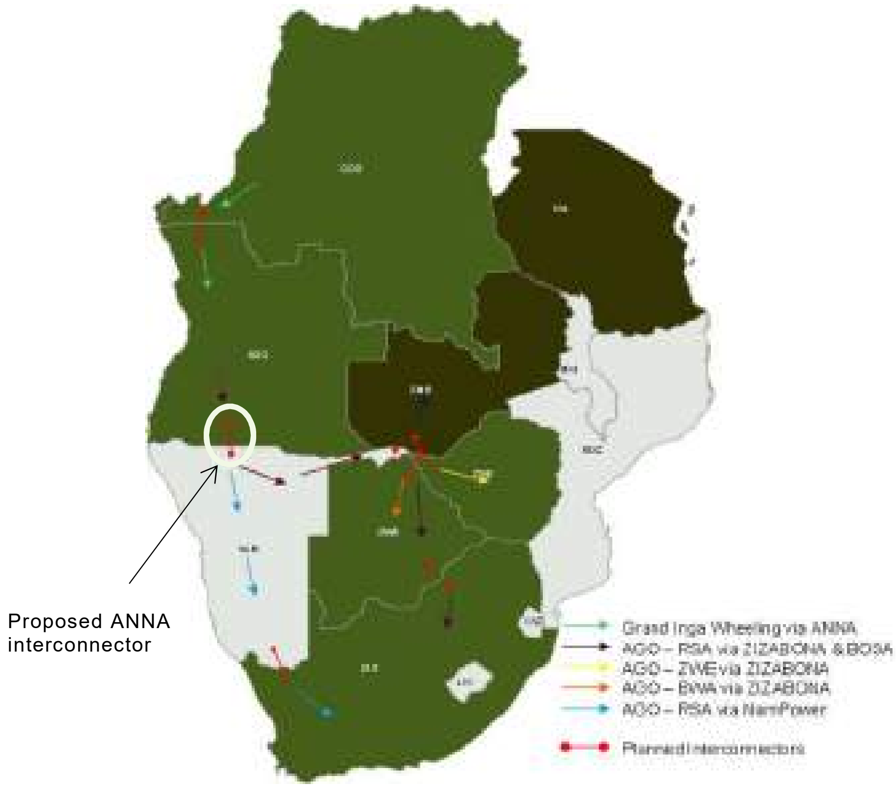


Figure 2.8: Potential power flows that can be facilitated by the ANNA Interconnector project *(arrows for illustration only)*

2.3.5 Indirect Environmental and Societal benefits

An overarching objective of SAPP is to implement strategies in support of sustainable development priorities (SAPP, 2019) and reference is made to the contribution of the project towards the United Nations Development Programme (UNDP) Sustainable Development Goals (SDGs). The SDGs are introduced in more detail in Section 3.3.4 and a summary of how the project contributes to these is included in Section 8.6. Primarily, the project supports SDG 7: *Ensure access to affordable, reliable, sustainable and modern energy for all* through providing access to affordable and reliable energy and additional indirect environmental or societal benefits as described below.

Societal benefits can be considered as those which improve the welfare of society through social, economic and environmental interventions, including climate change. A key societal benefit is the potential increased renewable energy penetration, as described in Table 2.2, and the resultant benefit of improved access to renewable energy, namely hydropower and associated reductions in CO_2 emissions in the region, as discussed in Section 2.3.3. Expanding on these societal benefits that can be expected regionally also include the following items.

2.3.5.1 Biodiversity benefits

Climate change also has an impact on the environment, specifically biodiversity and on human activities that depend on the localecosystem services. Through reducing regional emissions, the project can be seen to directly benefit biodiversity and lower the following climate change related impacts (EU, 2013):

- Degradation of ecosystem services (such services specific to the area are described in Section 5.3.3, which are more critical to the subsistence of rural communities);

- Loss of habitats, fragmentation (including the extent or quality of the habitat, habitat fragmentation or isolation, as well as the impacts on the processes which are important for the creation and/or maintenance of ecosystems);
- Loss of species diversity; and
- Loss of genetic diversity.

On a broader level, the increase absorption of CO_2 by oceans causes ocean acidification and the increase absorption of CO_2 by plants results in carbon fertilisation and both effects affect terrestrial and marine biodiversity. Global warming and ocean acidification have a significant adverse impact on natural and human systems.

Therefore, the ANNA Project, through its reduction in regional GHG emissions, will contribute to alleviate, or mitigate, regional climate change impacts.

2.3.5.2 Displacement of diesel power generators

The displacement of diesel power generators due to access to power from the grid is a project benefit. Diesel exhaust consists of hundreds of gas-phases semi-volatile and particle-phase organic compounds that are produced through the combustion of fossil fuels. The greenhouse effect is a warming influence caused by the presence of gases and clouds in the air that are very efficient absorbers and radiators of the infrared radiation. The light-absorbing properties of diesel exhaust also affect the earth's radiation balance. Nitrous oxide (N_2O, a greenhouse gas) is a significant contributor to atmospheric warming. Diesel generators and diesel power plants are considered as potentially significant sources of anthropogenic N_2O emissions.

Diesel exhaust contains more than 40 toxic air contaminants, including many known or suspected cancer-causing substances, such as benzene, arsenic, and formaldehyde (Awofeso, 2011). In relation to human health, it is estimated that up to 70% of cancer riskattributable to inhalation of toxic air pollutants in the United States arise from diesel exhaust (Awofeso, 2011). Exposure to diesel exhaust has been linked to lung cancer in occupational settings.

The current main supply of power in the South of Angola is from diesel generation plants. The commissioning of the ANNA transmission interconnector will introduce alternative cleaner energy sources to this region and displacement large diesel power generators with significant benefits for the environment and health of surrounding communities.

It is expected that approximately 290 Mega Litre of diesel will be displaced from the diesel generation plants, annually (assuming 10 kWh/L), and that approximately 138 Tonnes of CO_2 will be displaced from the diesel generation plants, annually (assuming 0.047 Kg/kWh or 0.47 Kg/L).

2.3.5.3 Electrification of rural households within the project area, due to access to electricity

More specifically, the ANNA interconnector will facilitate the electrification of an estimated 250,000 households. Electrification is normally accompanied by a number of social and economic benefits, with most of these aligning with UNDP SDGs. These include the following (IEG 2008):

- Income benefits from access to electricity through new opportunities of work, especially in non-farm activities, in support of SDGs 7, 8 and 11;
- Leisure and domestic benefits from lighting and TV/radio;
- Time savings from household chores which can be used for leisure and productive activities;
- Education benefits through higher earnings for children living in electrified households that have higher educational attainment, in support of SDG 4;
- Increased productivity of home business through higher revenues of existing businesses and the creation of new home business, in support of SDGs 3, 5, 9 and 17;

- Increased agricultural productivity through higher revenues, in support of SDG 15 and this benefit will specifically be realised by agricultural developments near Cahama in Angola;
- Improved health outcomes and reduced mortality through improved indoor air quality from changes in lighting source, in support of SDG 3 (discussed in Section 2.3.5.2);
- Reduced fertility at lower costs, achieved through information channels that use electricity in lieu of reproductive health programs, in support of SDG 3, 7 and 10; and
- Public goods benefits, such as increased security and lower environmental contamination, SDG 16.

2.3.6 Summary

As stated before, the ANNA project was conceived from its start with the objective of promoting the highest positive economic, social and environmental impact possible whilst ensuring that all negative social and environmental impacts are addressed by avoiding negative impacts, or where they can't be avoided, minimising and compensating over and above the estimated impacts. This philosophy aims to ensure that the project attains a net positive social and environmental impact and contributes to the overall sustainable development of Angola and Namibia. These considerations were included in the initial conception of the project by means of selecting a route for the transmission line corridor that would avoid all identified sensitive environmental and social resources, as much as possible, as set in Section 2.10. The project design also included the applicable mitigation and adaptation measures, in order to minimise its vulnerability to climate change and increase its resilience.

In summary, interconnection projects, such as the ANNA transmission project, meet the objective of expanding electricity supply capacity in the SADC region, enhancing the availability and reliability of electricity supply in the respective countries and facilitating electricity trade in the SAPP grid. The development of the ANNA project thus far has considered various scenarios in the region to plan for climate variability most of which demonstrate a regional reduction of emissions. In the context of environmental and social benefits, the project will include the increased access to cross-border trading in renewable energy, mostly hydropower and associated potential to increase renewable energy penetration (mostly solar energy) in the region. Reductions in regional GHG emissions will contribute to mitigation of climate change and associated impacts on biodiversity and ecosystem services which are particularly important to vulnerable rural communities. The displacement of diesel generators in the south of Angola will, in itself, have a material impact on the reduction of GHG emissions and associated human health benefits. Lastly, electrification associated with the project will have number of positive societal impacts for the receiving communities. The project will therefore have overarching indirect environmental and societal benefits in the utility countries and the region. This is evident in that the project contributes towards meeting the SDGs, specifically SDG 7 which relates improved access to affordable, reliable, sustainable and modern energy. The scale of these benefits can also be interpreted as net gains for the project.

2.4 Project design

Permanent project components include the electrical infrastructure (substations and control buildings, transformers, transformer bays, line bays, busbars, reactive power compensation, etc.), the pylons that will support the overhead transmission line, foundations to support the pylons, powerline markers, and access roads and servitude areas. In addition, to reduce the potential negative impacts on avifauna in the area, bird flight diverters may be required on the powerline at certain sections, as recommended by the ecologist.

2.4.1 Electrical infrastructure

As shown in Figure 1.1, the ANNA Interconnector Project is a transboundary project that connects the high voltage electricity grids of northern Namibia and southern Angola. Figure 2.9 provides a schematic overview of the overall conceptual layout of the proposed project.

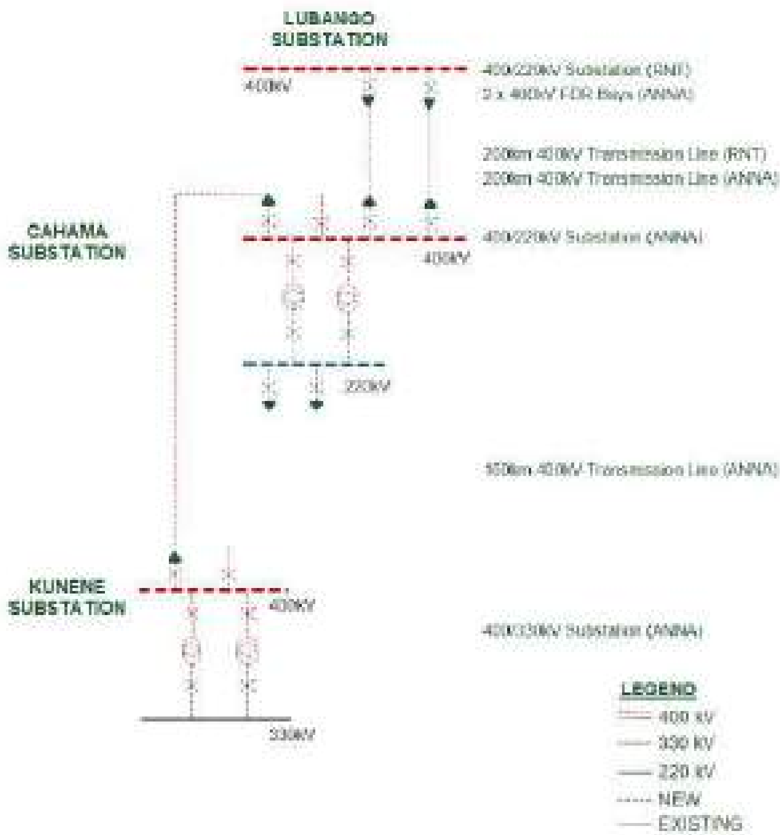


Figure 2.9: Electrical layout for the ANNA project as a whole

On a functional level, the project includes approximately 362 km of 400 kV single-circuit transmission line, with the following associated electrical infrastructure:

- Angola:
  - A fully-equipped 400 kV line bay (for Cahama) at the proposed Lubango substation (integrated in another project); and
  - complete Cahama 400/220 kV transmission substation, equipped with two 400/220 kV transformers and three 400 kV line bays (for Lubango, Kunene and proposed Baynes Power Station).
- Namibia:

- 400 kV feeder bays and associated electrical infrastructure within the proposed Kunene substation (currently under construction), which can be accommodated within the existing Environmental Clearance Certificate (ECC) for this substation, therefore no additional substations in Namibia are required.

The substation areas will include all the standard substation electrical equipment/components, such as transformers and busbars, and will also house control, operational, workshop and storage buildings/areas. The footprint of each substation will be in the order of 300 m x 200 m.

2.4.2 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 determine the optimised conductor size.

Preliminary discussions with RNT indicate the selection of an All-Aluminium Alloy Conductor (AAAC) Sorbus conductor. Figure 2.10 and Figure 2.11 illustrate the typical hardware that will be used for this installation.

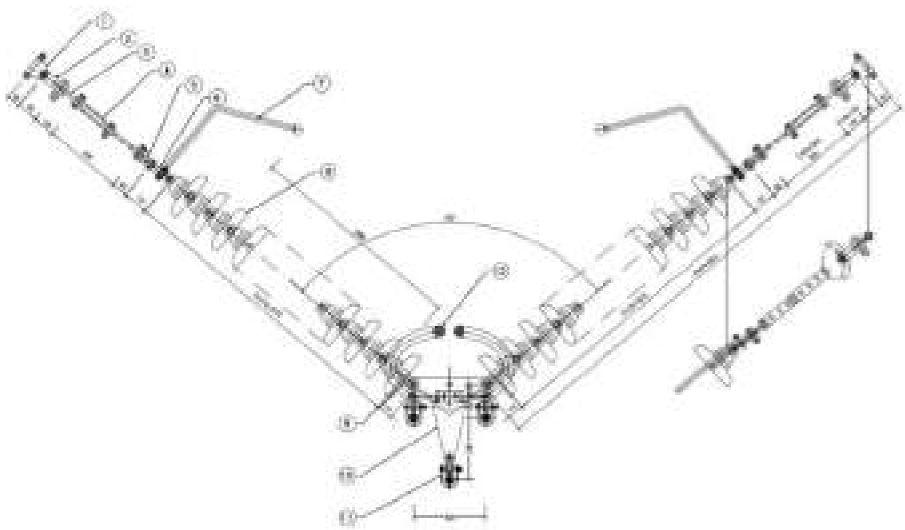
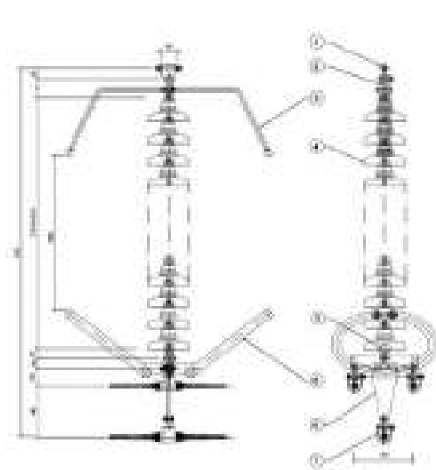
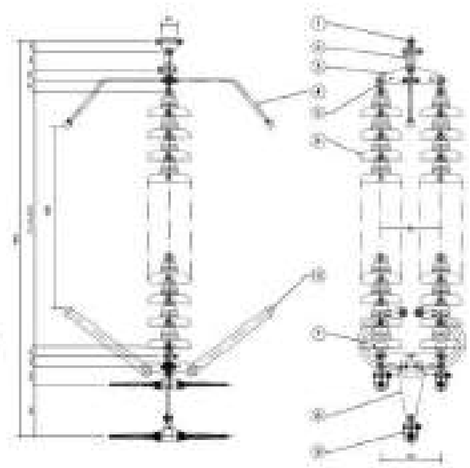


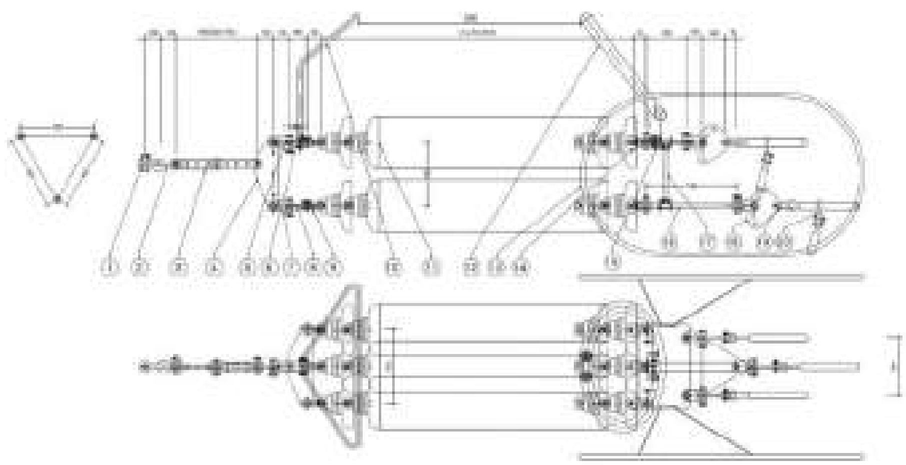
Figure 2.10: 400 kV insulator "V" suspension set for triple conductor





400 kV Insulator "I" suspension set for triple conductor single attachment

400 kV Double insulator "I" suspension set for triple conductor single attachment



400 kV Strain assembly for triple conductor 400 mm spacing single attachment

Figure 2.11: 400 kV Insulator "I" suspensions and strain assembly for triple conductor

2.4.3 Pylons structure options

Various types of pylon structures can be used, depending on the landscape, engineering and the biophysical environment.

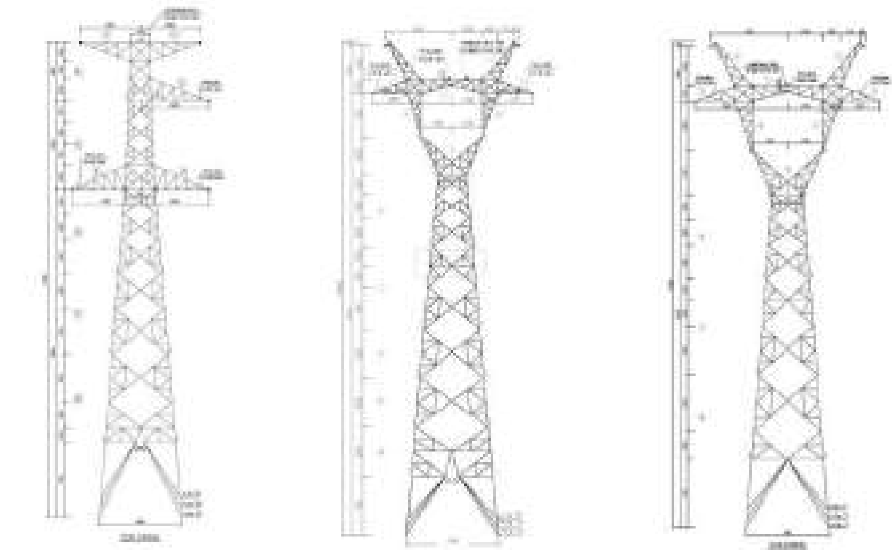
The final pylons sizes and positions will only be determined once the project has received the Environmental Installation Licence, once negotiations with landowners (if required) have been finalised, and after detailed geotechnical assessments and a pre-construction environmental and social walk-through has been completed. The final pylon positions will take into consideration any sensitive areas and/or No-Go areas identified by the ESIA specialists and during the walkthrough before construction.

Pylons will be selected and installed in accordance with the latest industry standards, and according to RNT's technical requirements at the time of construction, within the parameters of this assessment.

Pylons will vary between 54.5 m and 24 m in height and the distance between each pylon will be between 300 m and 500 m, depending on terrain. A Triple Sorbus AAAC conductor is proposed for RNT.

The footprint of each pylon foundation will be up to 12m x 10 m and foundations may be up to a maximum depth of 5 m. Foundations will occupy small portions of the servitude footprint, and the remainder of the footprint will remain open. The foundation types and depths vary, based on the pylons, type of soil, and type of terrain (rock).

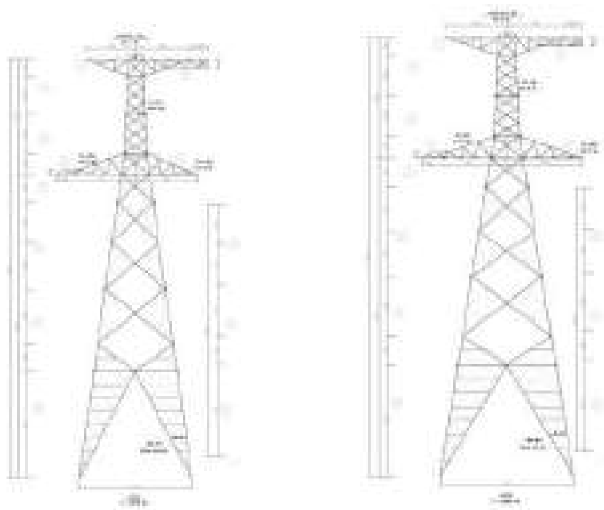
A combination of the following family of pylon structures will be used in Angola (Figure 2.12).



FAA Suspension Pylon
Max Height: 33.00 m
Min Height: 25.00 m

YAL Suspension Pylon
Max Height: 54.50 m
Min Height: 25.50 m

YAS Suspension Pylon
Max Height: 45.50 m
Min Height: 25.50 m



YAA Suspension Pylon
Max Height: 33.00 m
Min Height: 24.00 m

YAT Terminal Pylon
Max Height: 24.00 m
Min Height: 33.00 m

Figure 2.12: Family of pylon structures to be used in Angola

These standard pylons will be used on all sections of the line, except the crossing of the Kunene River, where specially-designed taller pylons will be required for the >800 m crossing.

2.4.4 Servitudes and clearances

A servitude (right-of-way) needs to be maintained to ensure the powerline's safety. The minimum servitude widths required for the powerlines are provided in Table 2.8. 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 servitude edges. The clearance requirements, i.e maximum heights permissible for the transmission line, can be found in Table 2.9.

Table 2.8 : Servitude widths

Line Voltage (kV)	Building restriction From line centre	Separation Parallel lines	Timber restriction Forestry area
220	23.5	32	38.5
400	27.5	35	38.5

Table 2.9: Clearances

Obstacle	Minimum vertical clearance (m)
Railway	9.0
Normal ground	8.5
Cultivated and open country	8.8
Communication lines and powerlines	4.0

The servitude will therefore impose restrictions on the land use within the line route. A 20 m wide strip will be cleared of trees and obstacles within the servitude, as well as a footprint of approximately 20 m x 20 m around each pylon.

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 servitude running along the transmission line where necessary. No paved access roads will be constructed, unless there are steep sections of the route where erosion is a risk. Generally, the access track would be a single dirt track with limited earthworks to protect the road and surroundings from erosion. Access roads can run the length of the proposed servitude and be directly below the transmission line, unless an access road already exists. Existing roads will be used as far as possible and upgraded if necessary.

2.4.5 Substations

As previously mentioned, the scope of work for the ANNA interconnector project within Angola consists of a 400 kV transmission line between Lubango and Cahama, and from Cahama to the Namibian border to ultimately connect to the planned Kunene Transmission Station in Namibia. The scope further consists of the development of the proposed new 400/220/60 kV Cahama substation, as well as two 400 kV feeder bays at the proposed new Lubango 400/220/60 kV substation. The complete design of the Lubango substation does not form part of the ANNA scope of work and is included in the Linha de Belém do Huambo -Lubango project (undertaken by others), which has already received an Environmental Licence.

The proposed transmission line will ultimately be a double circuit, of which only one circuit forms part of the ANNA project's scope of work.

The substations will be constructed to Angola's standards, including all standard transmission substation equipment, structures and buildings. The footprint extent of each substation will be in the order of 300 m x 200 m (6 hectare (ha)).

The main characteristics of the substations included in this ESIA are described below.

2.4.5.1 Lubango substation

The scope of work for the Lubango substation include the construction of two 400 kV feeder bays to Cahama, with a line reactor for each feeder. In addition to the line reactors, two switchable busbar reactors will be installed.

One of the line feeder bays will be fully equipped to match the other 400 kV line feeder bays to be developed at the Lubango substation, while the other feeder bay will remain unequipped until RNT decides in future to build the second line within the ANNA project corridor.

It is anticipated that the Lubango substation may already have been constructed when installation of the ANNA project's equipment commences. This implies that there will be no change to the substation's original footprint, and therefore no relevant environmental or social impacts are expected for this component of the ANNA project.

2.4.5.2 Cahama substation

The new Cahama substation will be a complete 400/220/60 kV substation with a breaker-and-a-half configuration on 400 kV, and double busbar configuration on 220 kV and 60 kV. The main substation components will include:

- 2 x 150 Mega Volt Amp (MVA) 400/220/15 kV auto transformer bays
- 2 x 400 kV feeder bays to Lubango (ANNA) and space for two future feeders to Baynes, with a line reactor for each feeder. In addition to the line reactors, 1 x switchable busbar reactor will be installed.
- 1 x 220 kV feeder bay with a bypass, allowance for 3 x future 220 kV bays, and a 1 x 220 kV bus coupler bay
- 1 x 60 MVA 220/60/15 kV transformer bay and allowance for a future transformer bay
- 2 x 60 kV feeder bays with a bypass to Cahama and Gambos, allowance for 2 x future 60 kV bays, and 1 x 60 kV bus coupler bay

2.5 Pre-construction phase

2.5.1 Land acquisition and resettlement

2.5.1.1 Requirements for resettlement

Land acquisition is required for the proposed project, primarily for the 55 m servitude 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), as described in Section 2.6.

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

A process is required to identify, consult and compensate project-affected persons or communities (PAP[1]s or PAC[2]s) for any physical or economic displacement inflicted as a result of project activities. This is usually undertaken through a Resettlement Action Plan (RAP). However, because the project is still at concept phase, a higher-level Resettlement Policy Framework (RPF) has been generated to identify objectives, principles, policies, procedures and organisational arrangements to deal with land access and resettlement (Annexure C of Volume III).

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[1] Project Affected People
[2] Project Affected Communities

2.5.1.2 Purpose of the Resettlement Policy Framework

The RPF was developed to ensure compliance with the following:

- The DBSA's Environmental and Social Safeguard Standard (ESSS) 5: Development-Induced Displacement and Resettlement;
- The IFC's Performance Standard (PS) 5: Land Acquisition and Involuntary Resettlement;
- IFC Handbook for Preparing a Resettlement Action Plan (2002);
- IFC Good Practice Handbook: Land Acquisition and Resettlement (Draft)(2019); and
- All legislation in Angola governing land acquisition and resettlement, namely:
  - Law no. 9/04, of 9 November - Land Law
  - Law no. 3/04, of 25 June - Law on Territorial and Urban Planning
  - Decree no. 2/06, of 23 January - General Regulation of Territorial, Urban and Rural Planning
  - Presidential Decree no. 216/11, of 8 August - National Policy for the Land Concession Rights
  - Presidential Decision No. 14/18 of 19 February – creating the Interministerial Commission whose objective is to promote the registration of Rural Land in favor of Local Communities.
  - Presidential Decree no. 117/16, of 30 May - Regulation of Rehousing Operations
  - Decree no. 58/07, of 13 July, General Regulation for Land Concession
  - Decree no. 01/01, of 5 January - Norms on the Resettlement of Displaced Populations,
  - Decree no. 79/02, of 6 December - Implementation of Norms on the Resettlement of Displaced Populations.

The guiding principle in the preparation of a RAP is to ensure that:

- All PAPs and PACs impacted by future land acquisition and potential resettlement issues, are properly consulted;
- Affordable and accessible grievance mechanisms are made available to PAPs and PACs;
- All PAPs and PACs are compensated for their losses in time, at replacement cost or market value (whichever is higher); and
- All PAPs and PACs are provided with rehabilitation measures so that they are at least as well off as they would have been in the absence of the project.

2.5.1.3 Timeframes

The resettlement action planning process can take between 6 and 18 months depending on the number of PAPs.

The following key timeframes should be applied:

- The inventory should be completed at most four months prior to the commencement of the demining and construction works; and
- Any site works should only commence once agreements between all parties have been reached.

2.5.1.4 Resettlement process

The resettlement process includes two main phases: planning, followed by implementation. Stakeholder engagement will run in parallel alongside these activities and build on what was undertaken during the ESIA. It may be in the form of key informant interviews, focus group meetings, public meetings, public sharing of documents and information, and/or consultation with individual households. Thereafter 'after project' community support, overlapping with the construction and operational phases, is required to ensure the resettlement is effectively implemented. Refer to Figure 2.13, and below, for the steps required.

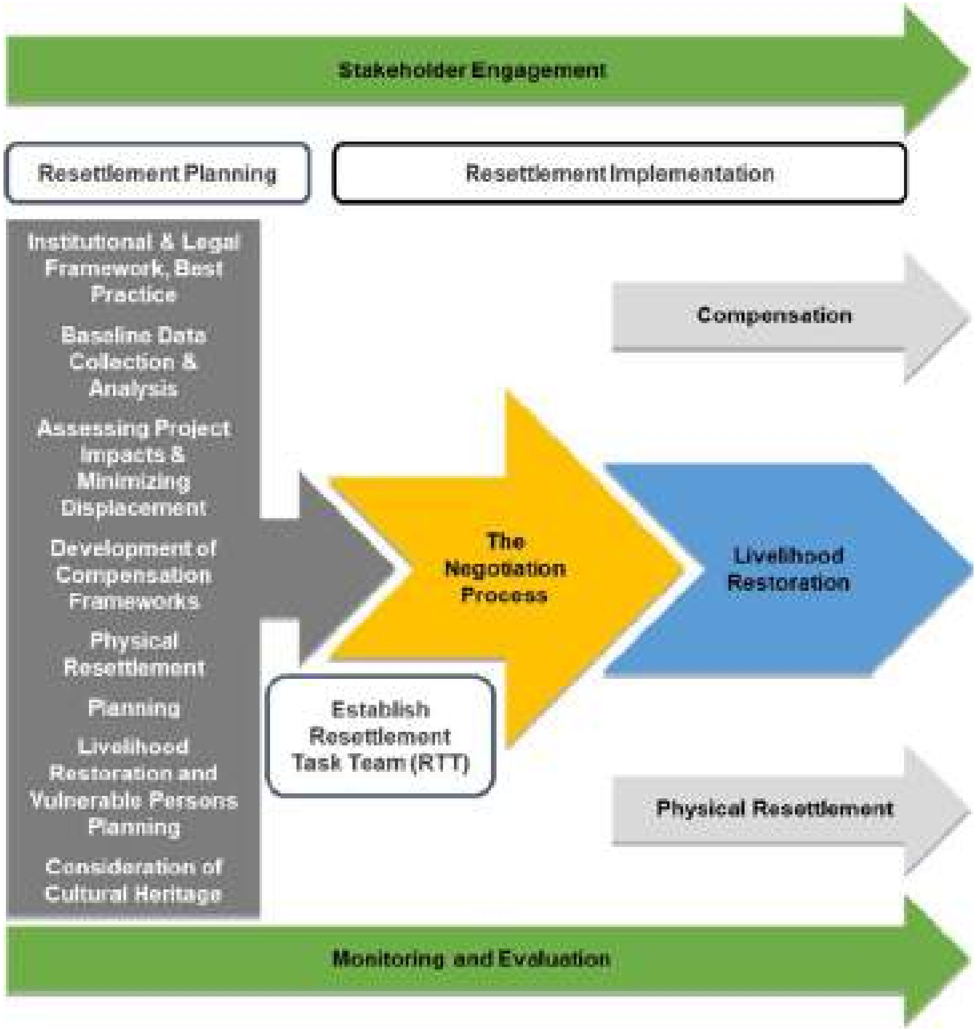

Figure 2.13: Resettlement process

Resettlement planning

- Establish Resettlement Task Team (RTT);
- Announce the project;
- Identify impacts;
- Undertake census, including socio-economic survey;
- Undertake inventory of assets;
- Develop compensation framework and identify livelihood restoration; and
- Prepare detailed budget (valuation), implementation schedule and organisational responsibilities.

RAP implementation

- Household consultation;
- Signing of contracts;
- Payments of compensation amounts;
- Resettlement activities (e.g. relocations); and

- Livelihood restoration activities.

After-project community support *(continuing into construction and operational phases)*

- Grievance mechanism, as stipulated in the Stakeholder Engagement Plan (see Section 4.5); and
- Monitoring, evaluation and reporting (including livelihood restoration monitoring).

2.5.2 Pre-construction activities

The following activities will take place once the necessary environmental authorisations, permits and/or licenses are in place:

- Demining activities;
- Walk-down survey to inform preferred alignment;
- Detailed survey to fix alignment (note that the resettlement planning process in Section 2.5.1 will inform this activity, as avoidance of assets will be prioritised);
- Servitude application, where required;
- Land use/acquisition process (refer to 2.5.1);
- Check survey for exact pylon locations;
- Geotechnical investigation of selected substation and pylon locations to inform foundation design;
- Final designs.

2.6 Construction phase

2.6.1 Construction schedule

The construction phase is expected to take 24 - 36 months, but this can vary depending on the weather conditions at the time of construction, as well as on the construction method proposed by the contractor.

Work will not necessarily be undertaken in a linear sequence, as most of the activities can be undertaken concurrently and in parallel, depending on the phasing of construction and on the Contractor's strategy and resource management.

2.6.2 Construction activities

Construction will be undertaken according to construction methodologies and/or specifications of the power utility in each country. 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 construction camp/s, construction site/s, servitude, Cahama substation, and for each pylon location;
- Setup of construction camp/s (refer to Section 2.6.3 below);
- Transport of all the required materials, equipment and components to the camp/s and to each pylon location;
- Movement and operation of heavy machinery and equipment;
- Management of waste produced;
- Clearing trees from the right-of-way;
- Surveying and pegging of pylon locations;

- Earthworks associated with the pylon and substation foundations/platforms;
- Construction of concrete foundations to support substations and the pylons (including installation of stay-cables to the ground and the installation of support bases);
- Assembling and erecting pylons using temporary laydown areas at each pylon;
- 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 pylons. 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 substation areas (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

2.6.3 Construction camps

During construction, temporary laydown and site camp areas will be required. They will serve as logistical centres for construction activities along a given length of the line. It is expected that approximately 15-20 camps will be required in total (i.e. one camp per 20 km of line). The approximate size of each camp is 5 000 m^2 (0.5 ha).

The camps 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 areas will be done in consultation with RNT's Environmental Manager. The temporary construction camp and laydown areas will be rehabilitated once construction is complete.

Each camp is expected to include the following components:

- A site office, consisting of prefabricated units;
- Accommodation (if located far from settlements), consisting of prefabricated units;
- Eating and ablution facilities;
- Laydown areas 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.

2.6.4 Materials and resources

The materials and resources that are likely to be used or generated on the construction site are not known at this stage of the project.

2.6.5 Construction workforce

A mixture of unskilled temporary employees, semi-skilled and highly-skilled employees will be required for construction. 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 camp, depending on the distance to the construction site.

2.7 Operation and maintenance phase

The operational phase refers to the operation of the proposed transmission line (electricity transmission) and associated infrastructure (i.e. substation), which will be maintained periodically according to the specifications of the power utility company. The following activities will be required during the anticipated operational lifespan of 30 years:

- General functioning of the transmission line (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 as defined in the ESMP (Volume III);
- 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 pylon footprints and substation interiors); and
- Periodic maintenance activities at the substations, which include cleaning insulators, checking circuits, testing batteries, replacing transformer oils, etc.

2.8 Decommissioning phase

The proposed powerline is considered permanent infrastructure and there is no intention to decommission. Decommissioning is undesirable, as its continued use would eliminate the need for a new transmission line and hence the associated use of additional resources in its construction. However, should the powerline need to be decommissioned at some stage, it would consist of the following activities, *inter alia*:

- Dismantling and removal of transmission cables and pylons;
- Rehabilitation of pylon foundations, accesses and other disturbed areas;
- Transport and disposal of the material off-site; and
- Monitoring (site surveys) may be required after rehabilitation has been completed. The aim of monitoring and maintenance is to ensure that the rehabilitation objectives were met, and that the rehabilitation process was successful.

As there is no intention to decommission the line, there has been no focus on decommissioning actions and impacts. Should the line be decommissioned, a decommissioning plan must be compiled, based on conditions at that time, as set out in the ESMP (Volume III)

2.9 Investment budget

From the Pre-feasibility Study, the estimated total project capital investment requirement is 310 000 000 USD (three hundred and ten million United States Dollars). This value is estimated to be split into 271 000 000 USD (two hundred and seventy-one million United States Dollars) for the Angolan part of the project, and 39 000 000 USD (thirty nine million United States Dollars) for the Namibian component.

This value may change as the project develops and has the potential to change further when the funds are raised.

2.10 Alternatives

According to the IFC's Performance Standards, the DBSA's Environmental and Social Safeguard Standards, and the Angolan EIA Regulations, alternatives must be considered during the ESIA process. An important function of the Scoping Phase was to identify reasonable and feasible alternatives for assessment in the ESIA phase. The motivation for assessing the preferred alternative against the No-Go alternative, is discussed below.

2.10.1 Activity alternatives

The only activity alternative that was considered, is an off-grid solution, which is based on renewable energy generation. Reference is made to the renewable energy (wind and solar) resource quality maps north of Namibia and south of Angola, as shown in Figure 2.14.

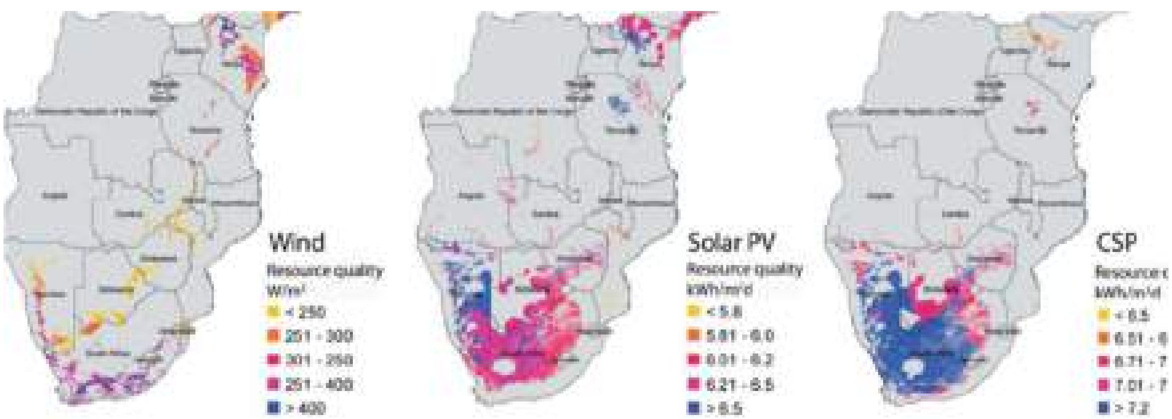

Figure 2.14: Renewable energy resource quality map for the region

These resource maps show that wind as a renewable energy resource is available in the north of Namibia but not in Angola, and solar as a renewable energy resource is available both in the north of Namibia as well as in the south of Angola.

Electrifying these areas off-grid will require solar photovoltaic (PV) plants (wind where available) to supply energy needs, and Battery Energy Storage (BESS) to support the variability of renewable energy generation and to provide synthetic inertia. Considering that solar is only available during the day, whilst energy is required for 24 hours a day, the solar PV plant will need to be oversized to charge the BESS sufficiently to satisfy the demand during the night and when there is cloud cover during the day.

The demand in the north of Namibia and in the south of Angola is envisaged to increase from 180 MW to 300 MW and from 100 MW to 1 200 MW respectively, between 2018 and 2040.

The minimum solar PV installed capacity required to supply this envisaged demand will be 300 MWp and 1 200 MWp for the north of Namibia and the south of Angola respectively. More capacity will be required to charge the BESS.

The associated capacity factors for solar PV is 25%, assuming a typical load factor of 50% (for the load). The required solar PV installation will be 600 MWp and 2 400 MWp for the north of Namibia and for the south of Angola respectively.

Assuming 100% for both Depth of Discharge (DoD) Round Trip Efficiencies (RTE) on BESS, the minimum required BESS for the north of Namibia and the south of Angola is 300 MW/1 200 MWh and 1 200 MW/ 4 800 MWh respectively.

Assuming a typical solar PV land requirement of 0.5 MW per ha, the associated flat land requirements (excluding substation balancing) is 1 200 ha and 4 800 ha, for the north of Namibia and for the south of Angola respectively.

The associated cost for solar PV and BESS is USD1.1 billion and USD4.4 billion for the north of Namibia and for the south of Angola respectively. This conservative cost of USD5.5 billion for an off-grid solution can be weighed up against an investment of approximately USD200 million for the 390 km of 400 kV transmission interconnector line, excluding the hydro generation investment. This interconnector connects the proposed hydro-power from the Kwanza River (>5 000 MW) to the SAPP region, and enables the integration of the proposed Baynes (600 MW) hydro-power plant.

There are still viable opportunities for off-grid solutions within the north of Namibia and the south of Angola. However, not harnessing the potential of the hydro-power in the Kwanza River for the region, will be a missed opportunity. The ANNA interconnector will also enable higher renewable energy penetration in Namibia. Without this, Namibia will have to procure more storage capacity and synthetic inertia from chemical-based facilities at a higher cost.

On consideration of the above, an off-grid solution as an alternative activity will not be assessed in this ESIA.

2.10.2 Preferred alternative

As detailed further in Section 4.2, considerable effort has been undertaken to identify the best practical environmental option for the alignment of the proposed ANNA transmission line. This approach aligns with the IFC's PS1 (Assessment and Management of Environmental and Social Risks and Impacts), which advocates for sustainable development through the adoption of a mitigation hierarchy. The project, as described in Sections 2.1 to 2.8, is therefore the preferred alternative that will be assessed against the No-Go alternative.

2.10.3 No-Go alternative

The No-Go alternative assumes that the *status quo* remains and that the proposed project is not developed. The No-Go alternative is defined as the option of no 400 kV overhead transmission line connecting Angola and Namibia. In this case, the objective of transmitting electricity to assist in alleviating the current electricity supply constraints and meeting the future electricity demands in Angola, will not be achieved. The No-Go alternative serves as a basis for comparison in the impact assessment and can validate the need and desirability for the project.

2.11 Future associated energy projects

As discussed previously, one of the main objectives of the ANNA project is to ensure power supply to certain municipalities in the southern part of Angola, primarily in the Cunene Province, as well as to provide for the future integration of the transmission line from the proposed Baynes Hydro-power facility.

The ANNA project will enable the provision of electricity to several settlements in Angola, mainly municipal and communal administrative centres (Figure 2.15). In the Angolan part of the ANNA project, this will be done by creating distribution substations, linked to transmission substations associated with this project, namely:

- Lubango Substation (transmission – transform 400 kV to 200 kV) to:
  - Matala Substation (distribution– transform 200 kV to 60 kV): provision to Matala, Capelongo and Quipungo
- Cahama Substation (transmission – transform 400 kV to 200 kV) to:
  - Cahama Substation (distribution– transform 200 kV to 60 kV): provision to Cahama and Chiange
  - Xangongo Substation (distribution– transform 200 kV to 60 kV): provision to Xangongo, Humbe and Nalulila/Calueque
  - Ondjiva Substation (distribution– transform 200 kV to 60 kV): provision to Ondjiva and Namacunde

At this stage of the project, details regarding the location of the proposed distribution substations, and the routes of the electricity lines that will connect this infrastructure, are unknown.

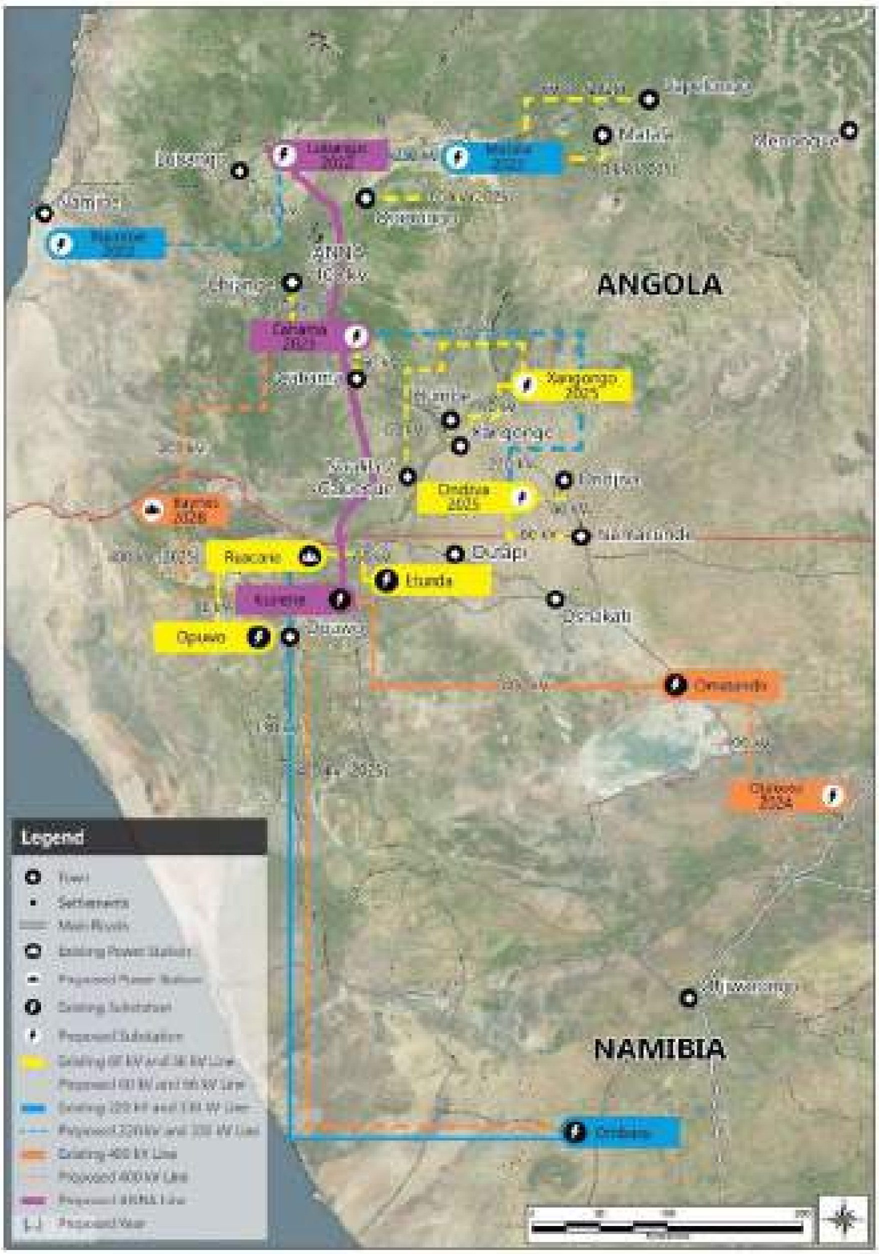

Figure 2.15: Electricity grid dependent on the implementation of the ANNA Project

3 Legal and institutional framework

This section provides an overview of the legal and policy documents and guidelines applicable to the ESIA process for the proposed ANNA project, specific to the Angolan portion of the transmission line corridor that is under consideration.

The overarching legislation applicable in Angola is the Environmental Framework Law (Law no. 5/98 of 19 June) and associated EIA Regulations (refer to Section 3.1). As a donor-funded, transboundary project, the ESIA process needs to comply with the national legislation, IFC's Performance Standards and the World Bank Environmental and Social Framework (World Bank, 2017). The IFC's Performance Standards (IFC, 2012)[1] are designed to ensure that financed projects are carried out in an environmentally and socially responsible manner and are linked closely with the DBSA's Environmental and Social Safeguards (ESS). The applicability to the international guidance is provided in Section 3.3.

3.1 Applicable Angolan legislation

3.1.1 Legal framework applicable to environmental licencing

The **Constitution of the Republic of Angola** (Lei Constitucional da República de Angola, 2010) provides the basis for the Environment Framework Law via two articles: Article 21 determines the State's fundamental responsibilities, including the promotion of the harmonious and sustainable development of all national territory, protecting the environment, the natural resources and the historical, cultural and artistic national heritage. Article 39 on Environmental Rights states that all citizens have the right to live in a healthy and unpolluted environment, as well as have a duty to defend and preserve it. The State will take the necessary measures to protect and preserve the environment and the national species of flora and fauna throughout the national territory, to maintain the ecological balance, to ensure the correct location of economic activities and the rational use of all natural resources within the framework of sustainable development, and to respect the rights of future generations. The law enforces punitive measures for acts that endanger or damage the preservation of the environment.

With regards to the social component that may have an influence on the project, Article 21 of the Angolan Constitution states that the State's fundamental responsibilities include the promotion of the wellbeing, social solidarity and quality of life of the Angolan people, especially the most disadvantaged population groups. Complementary Article 37, regarding the rights of property, requisition and expropriation, states that expropriation can only be allowed for public utility, by means of fair and prompt compensation, under the terms of the Constitution and the law. The payment of this compensation is a condition for effective expropriation.

The **Angolan Land Law**, Law no. 09/04 of November 9, grants citizens access to land and the right to use it. This Land Law regulates all land rights and establishes the basis for the property regime, land ownership and various types of land occupation. Under the Land Law, land is owned by the State and may be made available for 'useful and effective' purposes. The Land Law is also intended to ensure respect for traditional land rights.

The **Environmental Framework Law,** Law no. 5/98 of 19 June, defines the framework for all environmental legislation and regulations in Angola and provides the definitions of key concepts, including protection, preservation and conservation of the environment, the promotion of quality of life and the use of natural resources. This Law incorporates key international sustainable development declarations and agendas (e.g. Agenda 21 and the National Environmental Management Programme) and also establishes citizens' rights and responsibilities.

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[1] International Finance Corporation. 2012. IFC Performance Standards on Environmental and Social Sustainability. IFC: Washington DC.

Article 14 allows for the establishment of environmental protection areas and the setting of rules for those areas, including the identification of activities that are prohibited or permitted in the protected areas and their surroundings.

Article 16 of the Law provides for environmental impact assessments (EIAs) to be undertaken for all activities that may have an impact on the balance and wellbeing of the environment and society. Clause 2 of this Article states that more specific legislation on EIAs will be developed by the Government. Article 17 deals with the need for environmental licensing and Article 18 refers to environmental auditing.

An Environmental Licence provides an umbrella authorisation for project infrastructure and is regulated by the Decree no. 59/2007 of 13 July (**Decree on Environmental Licencing Process**). The EIA is regulated by Decree no. 51/2004 of 23 July, and its aim is to ensure better environmental protection, particularly of human activities likely to have an impact on the environment, by providing regulations on the procedures and norms to conduct EIAs of public and private projects which, due to their nature, dimension or location, might have significant environmental and social impacts, and establishes who is the entity responsible for compliance with these legal requirements (DNPAIA, the department in charge of the EIA process inside MINAMB, the Environmental Ministry). Article 3 of this Decree also includes definitions on what is meant by environmental audit, environmental impact assessment, environmental impact study, public consultation, etc.; Article 4 states which projects will require an EIA and which projects might be exempted, for example those aimed at national defence and security; Article 6 states what elements and information is to be included in the EIA procedure; Article 10 sets the procedure, nature and extent of public participation and indicates that these costs should be covered by the project proponent; Article 16 indicates what is considered to be a violation of this Decree; Article 17 sets out the penalties for various offences; and finally Article 22 states that regular environmental audits shall be conducted.

The Environmental Licencing (EL) Process, regulated by Decree no. 59/2007 of 13 July, provides additional legislation and guidance on the EIA process by establishing which projects are subject to Environmental Licences (Article 3), what information is required be included in the licencing request upon submission of the EIA Report to the Authorities (Article 6); and sets out all the activities that require an EL (Article 10).

This Decree states that there are two types of EL: the Environmental Installation Licence and the Environmental Operation Licence. The first precedes the second (Article 12). The Installation Licence authorizes the construction phase of the project according to the licence conditions (Article 12). The Operation Licence is issued after observing all the requirements of the Environmental Impact Assessment process (Article 13). The content of the Operation EL includes information such as the best applicable technologies; all applicable measures to protect the environment, prevent pollution and manage waste; the threshold values for the project's emissions; the monitoring measures to be implemented; and the validity of the EL, which cannot be less than three years or longer than eight years (Article 14).

The EL needs to be renewed before the end of its validity period and this renewal is preceded by an Environmental Audit (Article 16).

A person who constructs, implements or alters any installation without an Installation EL, or anyone who alters a system of production without the relevant licence, will be guilty of an offence and subject to a fine (Article 26).

This Decree sets out that only Angolan registered environmental consultants may submit an EIA for approval. Such consulting companies must register with the Ministry of Environment (Article 29). Foreign consulting companies or consortia intending to perform environmental consulting work in Angola are compelled to associate with Angolan consultants or consulting companies formed under Angolan Law (Article 31). Executive Decree no. 86/12 of 23 February sets out the **Regulation on the Technical Registration for Environmental Consulting Societies/Companies**, under which the companies need to register to be able to submit EIAs for approval and to perform environmental audits. The request for registration is made to MINAMB, which issues an Environmental Consultant Certificate that is valid for one year and needs to be renewed annually (Article 10). Only the EIAs submitted by entities with a valid certificate can be accepted and assessed (Article 12) and a list of all registered environmental consultants must be available to be consulted by interested parties (Article 14). Non-nationals may be recruited by registered consultants, provided that Angolan labour laws are respected (Article 15). The consultant that compiles an EIA for a project may not also be responsible for the environmental audit of that activity (Article16). No individual consultant can be accepted as a Certified Environmental Consultant and the companies in charge of site supervision (construction works) may not be Environmental Consultants (Article 17). The penalties to be paid for transgressions are set out in Article 20 and the annexures to this Decree list all the documentation required to request an Environmental Consultant Certificate.

Decree no. 302/2016 of 30 June approves **the Regulation on the Classification of Environmental Consulting and Auditing Societies/Companies,** in which environmental companies are classified as big, medium or small. A big company is deemed to have the technical capability to compile EIAs and Environmental Audits for projects with an investment value equivalent to, or exceeding, USD10 000 000 (ten million US Dollars) and should employ at least seven senior technicians in different areas of environmental expertise with the ability to develop an EIA or an Environmental Audit. A medium company is deemed to have the technical capability for projects with a value of between USD5 000 000 (five million US Dollars) and USD10 000 000 (ten million US Dollars) and should include at least five senior technicians with the ability to develop the required work. Finally, a small enterprise is deemed to have the technical capacity to develop an EIA or Environmental Audit for projects with a value of between USD1 000 000 (one million US Dollars) and USD5 000 000 (five million US Dollars) and should include at least three senior environmental technicians. This classification is reconfirmed with the renewal of a company's Environmental Registration.

Executive Decree no. 92/12 of 1 March, sets out the **Terms of Reference (ToR) for the Environmental Impact Assessment Report/Study** and provides the templates for the application forms, the simplified description of the project characteristics, and the generic minimum requirements for the EIA report structure. Due to this decree, some projects are subject to specific EIA ToRs (e.g. mining, oil and gas, industrial landfill or roads), released by MINAMB as a collection of booklets that provide guidance on the requirements for the impact assessment of these activities. There is no specific EIA ToR for transmission lines, or any kind of electrical linear infrastructure, hence the generic guidance set out in this Executive Decree has been followed in the development of the ANNA project EIA.

Finally, the **Regulations for Public Consultation for projects subjected to an EIA process** (Executive Decree no. 87/12 of 24 February) state that DNPAIA is the entity responsible for an EIA's public participation, after the EIA report has been submitted to this authority for evaluation. The objectives of these regulations include ensuring that the project information is released to the public and that public opinion on all relevant aspects of the project activities is collected (Article 3). Article 4 states that public consultation is undertaken by means of a public session, at which a panel is present, composed of a chairperson, who represents the DNPAIA, a secretary, and a rapporteur, who is responsible to conduct, register and document the public session (Article 4). The disclosure of the public session is MINAMB's responsibility (Article 7), and the terms and documentation, namely the NTS, to be released for this session, are explained in Article 8. The timeframes for public consultation/comment may not be shorter than five days, or more than 10 days (Article 9). Public participation during the public session may be verbal or written (Article 11) and all questions raised must be addressed orally during the session (Article 12). The minutes of the public session are prepared by the secretary, and reviewed and approved by the chairperson and the rapporteur, and serve as a basis for the technical advice for the EL process (Article 13). The project's proponent is responsible for all costs associated with the public consultation (Article 16).

3.1.2 Additional legislation, policies, plans guidelines and strategies

Additional associated legislation that is pertinent to, and that has the potential to influence the development of, this project, is presented below. These have been addressed by each specialist study, as applicable, and included in the development of this EIA Report.

Environment

- Joint Executive Decree no. 96/09 of 6 October – Approval of taxes applicable to the EIA process
- Decree no. 1/10 of 13 January - Environmental Auditing
- Presidential Decree no. 194/11 of 7 July - Environmental Damage Liability

Energy

- Law no. 14-A/96 of 31 May, amended by Law no. 27/15 of 14 December - General Law on Electricity
- Decree no. 47/01 of 20 July - Regulations for Energy Production
- Presidential Decree no. 256/11 of 29 September – Approval of National Policy and Strategy for Energy Security

Land Use and Regional Planning

- Law no. 3/04 of 25 June - Law on Territorial and Urban Planning
- Law no. 9/04 of 9 November - Land Law
- Decree no. 2/06 of 23 January - General Regulation on the Territorial, Urbanistic and Rural Plans (REPTUR)
- Presidential Decree No. 216/11 of 8 August - National Policy for Land Concession Rights
- Law no. 1/11 of 14 January - Basic General Regime of the National Planning System
- Presidential Decree no. 214/15 of 08 December – Approval of National Strategic Plan for Territorial Management (PLANEAT) 2015-2025

Water

- Law no. 6/02 of 21 June - Water Law
- Presidential Decree no. 261/11 of 6 October - Regulation on Water Quality
- Presidential Decree no. 141/12 of 21 June - Regulation for the Prevention and Control of Pollution in National Waters
- National Health Development Plan 2012-2025
- Presidential Decree no. 9/13 of 31 January – Approval of National Water Strategic Programme (PNEA) for the period 2013-2017
- Presidential Decree no. 82/14 of 21 April - Regulation of General Use of Water Resources
- Presidential Decree no. 126/17 of 13 June - National Water Plan

Waste Management

- Presidential Decree no. 190/12 of 24 August - Regulation on Waste Management
- Executive Decree no. 17/13 of 22 January - Waste management of residues resulting from building and demolition activities

Flora, Fauna and Conservation Areas

- Resolution no. 42/06 of 26 July - National Strategy and Action Plan for Biodiversity
- Resolution no 1/10 of 14 January - National Policy on Forests, Wildlife and Conservation Areas
- Presidential Decree no. 46/14 of 25 February – Approval of the National Action Programme to Fight Desertification (PANCOD)
- Resolution no. 27/16 of 22 July – Implementation of the Convention on Wetlands
- Executive Decree no. 433/16 of 26 October – Validation of the Certificate of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Law no. 6/17 of 24 January - Forest and Wildlife Law
- Executive Decree no. 252/18 of 13 July – Approval of the Red List of Species for Angola
- Presidential Decree no. 171/18 of 23 July - Forestry Regulation

Heritage

- Law no. 14/05 of 7 October - Cultural Heritage Law
- Decree no. 2/06 of 23 January - Architectural and Archaeological Heritage

Social Issues and Protection of Vulnerable Groups

- Resolution no. 9/04 of 4 June - National Strategy for Combating Poverty
- Presidential Decree no. 222/13 of 24 December - National Policy for Gender Equality and Equity
- Law no. 25/12 of 22 August - Child Protection and Integral Development Framework Law
- Presidential Decree no. 158/18 of 29 June – Approval of the National Development Plan 2018-2022

3.2 Regional Policies and Agreements

3.2.1 Southern African Power Pool (SAPP) Policies and Agreements

The SAPP is a regional body that optimises the use of available energy resources in the region and facilitates a reliable and economic electricity supply to consumers of each of the 16 SAPP utilities and Independent Power Producers, consistent with the reasonable utilisation of natural resources and effects on the environment, and a stable interconnected electrical system.

The Southern African Power Pool consists of 12 SADC member countries represented by their respective power utilities (Figure 3.1) (SAPP, 2018a).

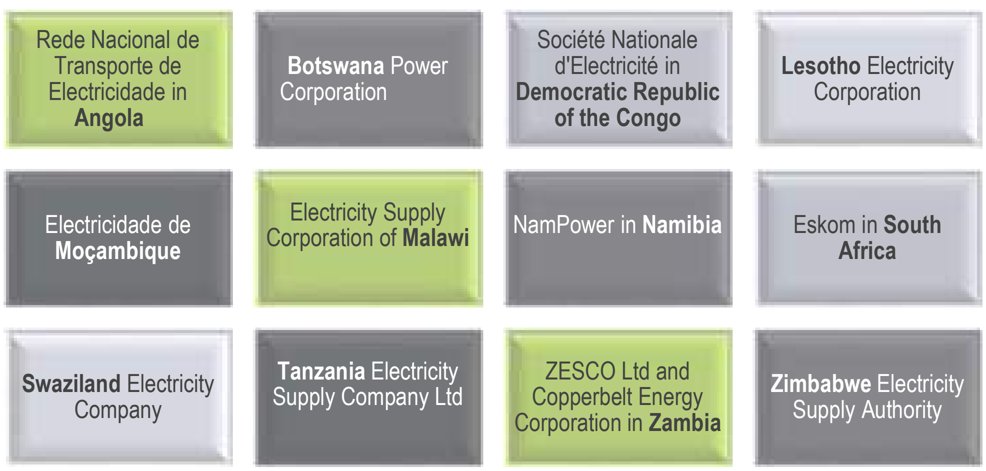

Figure 3.1: SADC member countries of the SAPP Policy

3.2.1.1 Environmental and Social Management Framework

The SAPP has developed an Environmental and Social Management Framework (ESMF) (SAPP, 2018b) which serves as a reference manual to assist in the high-level environmental and social screening of projects to strengthen the assessment and management of risks and impacts. The ESMF is particularly relevant where project loans are required from international financial institutions, such as the World Bank and DBSA, that apply their safeguard standards and guidelines to support environmental and social sustainability.

Of relevance to the project, the following tools have been consulted:

- Generic stakeholder engagement process;
- Specialist terms of reference;

- Generic impact rating methodology[1;]
- Typical risks, impacts and mitigation measures associated with energy generation and transmission projects; and
- Environmental Management Plan: Transmission lines.

3.2.1.2 ESIA Guidelines for Transmission Infrastructure

The SAPP has developed the Environmental and Social Impact Assessment Guidelines for Transmission Infrastructure as a tool to assist in completing an ESIA (SAPP, 2010). The Guidelines also promote meeting the environmental and social requirements of the host countries and the finance institutions and take into consideration the transboundary nature of SAPP projects.

The document provides guidance on, *inter alia*, project screening, recommended format and components of an ESIA and ESMP[2], approach to public participation, identification of impacts, mitigation measures and monitoring. Of specific relevance are the mitigation measures which have been included in the ESMP (Vol. III), where applicable.

3.3 International financial institution standards and policies

3.3.1 IFC Performance Standards for Environmental and Social Sustainability

The 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.

The PSs are listed below and described in more detail in Annexure C, where the relevance to the project is discussed.

- PS1: Assessment and Management of Environmental and Social Risks and Impacts
- PS2: Labour and Working Conditions
- PS3: Resource Efficiency and Pollution Prevention
- PS4: Community Health, Safety and Security
- PS5: Land Acquisition and Involuntary Resettlement
- PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- PS7: Indigenous Peoples
- PS8: Cultural Heritage

A financial safeguard gap analysis of the project against these PSs has been undertaken and documented in Section 8.7.

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1 Although the impact assessment methodology must also comply with in-country legislation and financial institution safeguards.
2 Note that whilst mitigation is included in the ESIA Report (Vol. II), the ESMP (Vol. III) is a separate document due to the volume of the content and so that the implementing agents have a more concise tool to manage impacts in the following phases of the project.

3.3.2 DBSA Environmental and Social Safeguard Standards (ESSS)

The DBSA is a multilateral development finance institution that funds infrastructure development in the SADC region. It aims to accelerate sustainable development, such that it improves the quality of life of people, supports economic growth and regional integration, and promotes the sustainable use of scarce resources.

The latest DBSA ESSS was issued in 2018 (DBSA, 2018). These ESSS are used by the DBSA to manage social and environmental risks in its investment decision-making. The ESSS are listed below and described in more detail in Annexure C where the relevance to the project is discussed:

- ESSS1: Assessment and Management of Environmental and Social Risks and Impacts
- ESSS2: Stakeholder Engagement and Information Disclosure
- ESSS3: Gender Mainstreaming
- ESSS4: Indigenous Peoples
- ESSS5: Land Acquisition, Land Use Restrictions and Involuntary Resettlement
- ESSS6: Labour and Working Conditions
- ESSS7: Community Health and Safety
- ESSS8: Cultural Heritage
- ESSS9: Biodiversity Conservation and Sustainable Living Natural Resources Management
- ESSS10: Resource Efficiency, Pollution Prevention and Management
- ESSS11: Safety of Dams (not applicable to this project).

A financial safeguard gap analysis of the project against these ESSS has been undertaken and documented in Section 8.7.

3.3.3 IFC Environmental, Health, and Safety Guidelines

The IFC's Environmental, Health, and Safety Guidelines (EHS) Guidelines (IFC, 2007a) 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.

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, 2007b) are therefore also relevant to the proposed 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.

Both of these guidelines are included in detail in the ESMP (Volume III).

3.3.4 United Nations Development Programme Sustainable Development Goals

An overarching objective of SAPP is to implement strategies in support of sustainable development priorities (SAPP, 2019) and reference is made to the contribution of the project towards the United Nations Development Programme (UNDP) Sustainable Development Goals (SDG).

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future (UN, 2019). The 17 SDGs are the basis of an urgent call for action by all countries in a global partnership with recognition that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests. The 17 SDGs are shown in Figure 3.2.

Source: UN, 2019

Figure 3.2: United Nations Development Programme Sustainable Development Goals

Each goal is described in more detail below, together with associated targets and indicators:

- SDG1: No Poverty - End poverty in all forms everywhere;
- SDG2: Zero Hunger - End hunger, achieve food security and improved nutrition and promote sustainable agriculture;
- SDG3: Good Health and Wellbeing - Ensure healthy lives and promote wellbeing for all at all ages;
- SDG4: Quality Education - Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;
- SDG5: Gender Equality - Achieve gender equality and empower all women and girls;
- SDG6: Clean Water and Sanitation - Ensure availability and sustainable management of water and sanitation for all;
- SDG7: Affordable and Clean Energy - Ensure access to affordable, reliable, sustainable and modern energy for all;
- SDG8: Decent Work and Economic Growth - Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;
- SDG9: Industry, Innovation and Infrastructure - Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;
- SDG10: Reduced Inequality - Reduce inequality within and among countries;
- SDG11: Sustainable Cities and Communities - Make cities and human settlements inclusive, safe, resilient and sustainable;
- SDG12: Responsible Consumption and Production - Ensure sustainable consumption and production patterns;
- SDG13: Climate Action - Take urgent action to combat climate change and its impacts;

- SDG14: Life Below Water - Conserve and sustainably use the oceans, seas and marine resources for sustainable development;
- SDG15: Life on Land - Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss;
- SDG16: Peace and Justice Strong Institutions - Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels; and
- SDG17: Partnerships to achieve the Goal - Strengthen the means of implementation and revitalize the global partnership for sustainable development.

3.4 Environmental and social categorisation

By virtue of the source of funding, the project is subjected to financial institution safeguards, as described in Section 3.3. These institutions require that certain identified projects are classified to determine the level of environmental and social assessment to be applied.

DBSA and IFC use similar classification systems that categorise projects into one of four environmental assessment categories as follows (refer to Figure 3.3 and Table 3.1):

Figure 3.3: DBSA (2018) and IFC (2012) project categories

Table 3.1: Project categorisation

Risk	IFC (2012)	DBSA (2018)
High	**Category A:** Business activities with potential adverse environmental or social risks and/or impacts that are diverse, irreversible, or unprecedented.	**Category 1**: The environmental impacts generated by these projects are likely to be significant, broad and diverse. They may be irreversible and could lead to significant impacts on the social, physical and biological environment, and changes in land use. Project types include, *inter alia*: • Any project requiring a Resettlement Action Plan; • Projects with large resettlement components and all projects with major impacts on human populations; and • Projects affecting tribal or indigenous populations.
Medium	**Category B**: Business activities with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.	**Category 2**: programmes and projects thatmay have adverse environmental and social impacts but which are likely to be potentially less severe than those associated with Category 1, high and substantial risk projects. For Category 2 projects few impacts are irreversible and mitigation measures can be more easily prescribed. Project types include, *inter alia*: • Transmission projects.
Low	**Category C**: Business activities with minimal or no adverse environmental or social risks and/or impacts.	**Category 3:** These projects are unlikely to have adverse environmental impacts as the social, physical and biophysical environments will not be significantly affected.

Risk	IFC (2012)	DBSA (2018)
Business activities	**Category FI**: Business activities involving investments in financial intermediaries or through delivery mechanisms involving financial intermediation. This category has further sub-categories.	**Category 4 / F1:** involve DBSA lending to financial intermediaries that on-lend or invest in subprojects that may result in adverse environmental and social impacts.

According to the DBSA (2018), electrical transmission projects are typically listed as Category 2 (Medium risk) projects, as most potential negative impacts are expected to be reversible with the implementation of prescribed mitigation measures, but projects affecting indigenous people, as well as those requiring resettlement, are listed as Category 1 (High risk).

For this project, however, a Medium Risk categorisation is considered appropriate, in terms of both the IFC (2012) and DBSA (2018) categories, as the potential adverse environmental or social risks and/or impacts are generally site-specific, largely reversible, and readily addressed through mitigation measures. The motivation for this is that no critical biodiversity areas, protected areas or areas of dense population, where significant resettlement would be required, have been identified.

This categorisation was reviewed after the impact assessment was undertaken and it was found that most impacts are related to construction and are short term, reversible and /or can be readily addressed with mitigation, with only a few impacts of moderate negative significance remaining after the application of mitigation. The other residual impacts being negligible or minor significance (refer to the Section 8 - Conclusions and final recommendations). Similarly, with operation, no residual impacts of major negative significance were identified, only a few moderate, and the rest were considered of minor or negligible significance.

The most significant risk of the project is the safety of construction and operational workers due to the potential for the occurrence of landmines. This will require an official demining operation prior to construction. However, the risk of landmines is not a result of the project, as these landmines have been present in the area since the Angolan-Namibian-South African conflict during the 1970s and 1980s and are an ever-present risk to populations of this region, in certain areas (mainly along watercourses and areas subject to erosion). The project will therefore leave communities better off after demining and it has been identified as a significative positive impact.

Although the project is transboundary, and indigenous populations such as the Himba and the San ethnic groups dispersed throughout the territory in Huila e Cunene Provinces in Angola would be affected, it is not anticipated that the project would have major impacts on human populations. Limited involuntary resettlement is required along certain sections of the proposed route in Angola. A livelihoods restoration programme required as part of the resettlement process will serve to leave communities better off through addressing needs such as investment in water resources (e.g. creation or repair of boreholes and associated solar pumps) and electricity (PV installation on nearest schools or health care centres).

Based on the above, and due this project being included in the list set out in the Annexure of the Angolan EIA regulations, an ESIA process will be undertaken for the proposed project[1]. In order to comply with international requirements, some additional documentation, such as a Scoping Report phase and an ESMP (Volume III) containing sufficient detail to assess, manage and mitigate the project's environmental and social risks and outcomes, was also compiled.

A Stakeholder Engagement Plan (SEP) and a Vulnerable Groups Plan (VGP) were prepared to provide the appropriate engagement process and to ensure that all concerned parties (particularly vulnerable indigenous people and women) are included during all stages of the project lifecycle. A Resettlement Policy

[1] This was the approach agreed upon with the DNPAIA on 3 September 2018.

Framework (RPF)[1] has been prepared and summarised in Section 2.5.1 and Section 4.5.3.4, and resettlement-related impacts have been assessed by the social specialist and included in Section 6.4.1. All of the mentioned documents are presented as Annexure A to C of the ESMP (Volume III).

[1] At this stage it is not known when the project will commence. Therefore, the details of the project at this stage are not specific enough for a full Resettlement Action Plan (RAP). The document is thus a RPF that sets out the policy for a detailed RAP that must be undertaken prior to the commencement of the project to ensure that compensation is commensurate with the economic conditions at that time.

4 Environmental and Social Impact Assessment scope and methodology

4.1 Framework of the ESIA process

The flow diagram in Figure 4.1 below provides an outline of the ESIA process that must be followed for the Angolan section of the transmission route. The process described below aims to reconcile the requirements of the Angolan legislation, namely the project's Environmental Licensing, with the conditions associated with international financing due to this being a cross-border project. The proposed future opportunities for the public and stakeholders to participate in the ESIA process, are highlighted in bold font below, and more details regarding the stakeholder engagement process are provided in Section 4.5.

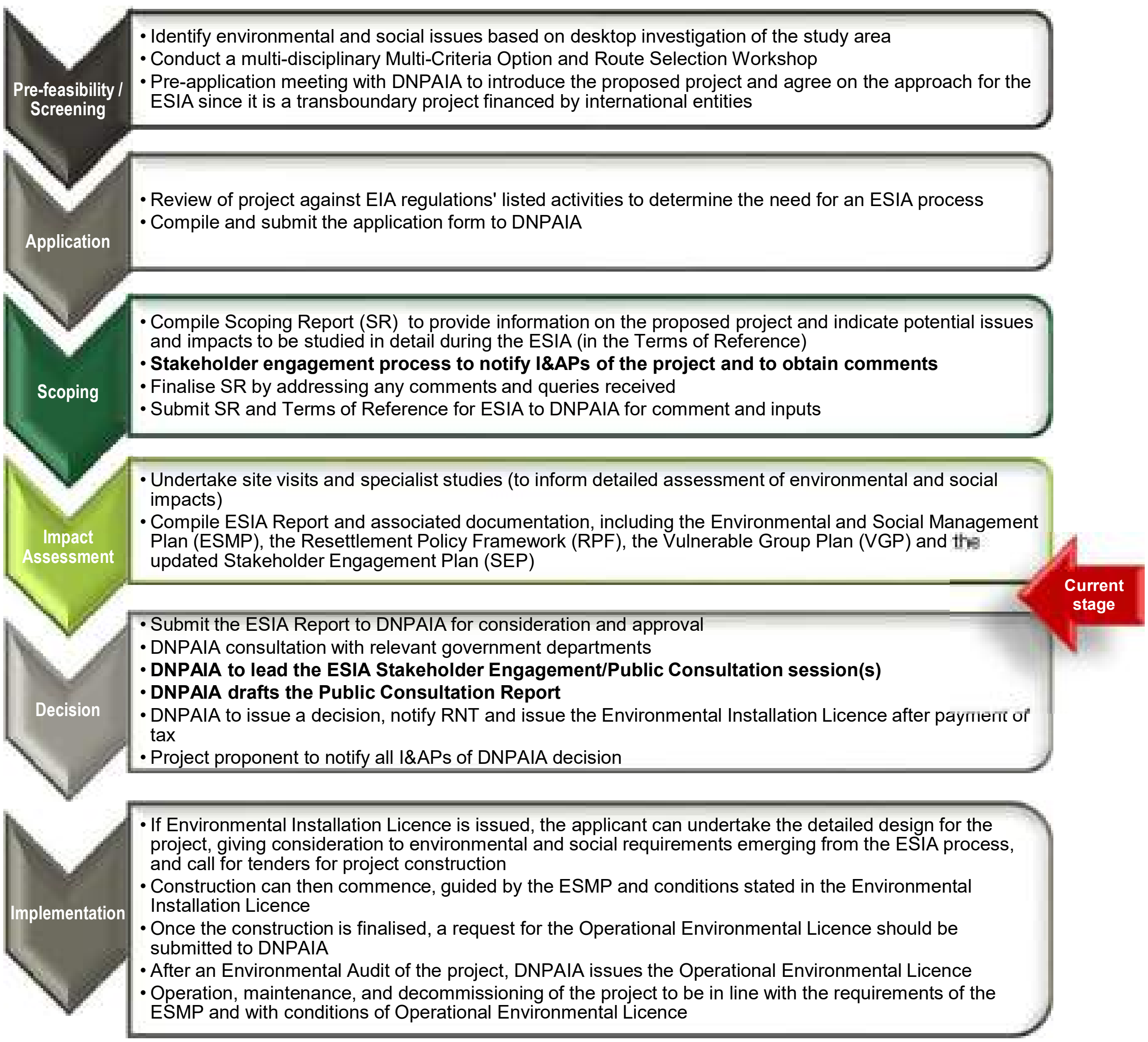

Figure 4.1: ESIA process overview

4.2 Pre-feasibility and Screening Phase

The Pre-feasibility and Screening Phase comprised high-level screening and assessment of the general study area to determine constraints and opportunities associated with the project and to develop potential line route corridors between northern Namibia and southern Angola. This process was led by the Aurecon engendering team but was multi-disciplinary and iterative, considering technical, environmental and social criteria. The process involved the identification of initial corridor options, a preferred corridor and then a preferred alignment within that corridor, which forms the basis of this assessment.

Furthermore, as part of the Pre-feasibility and Screening Phase, a pre-application meeting was held on 3 September 2018 with DNPAIA, Aurecon and representatives from RNT, to introduce the project and to ensure that the ESIA process to be followed is in line with the requirements and/or expectations of MINAMB. The notes from the pre-application meeting are included in Annexure B. The proof of registration of the project for the ESIA process that followed these meetings, is also presented in Annexure B.

4.2.1 Overview of route selection process

The route selection process was led by Aurecon's technical team, in collaboration with a multi-disciplinary team comprising representatives from the DBSA, SAPP CC, RNT, NamPower, and the environmental and social representatives of Aurecon. Technical considerations in the areas of technical/financial, strategic, environmental considerations, social considerations and slope (topography) were evaluated to arrive at a preferred corridor. Figure 4.2 sets out the stages of the route selection process.

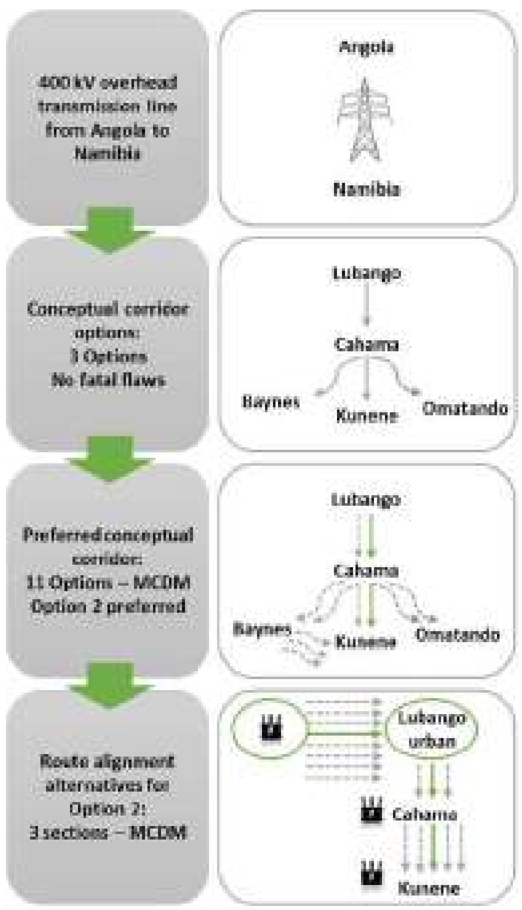

Figure 4.2: Route selection process

4.2.2 Conceptual corridor options

The project team followed a structured, systematic and comprehensive transmission line corridor selection process, following best practice. The outcome of this process was the identification of three straight-line transmission line corridor options. A high-level environmental and social screening exercise was undertaken, with publicly available data relevant to the study area, to assess these three proposed connection options, and no fatal flaws were identified. The three conceptual corridor options were:

- Option 1: Lubango – Cahama – Baynes – Kunene (i.e. 6 x line segment options to consider);
- Option 2: Lubango – Cahama – Kunene (i.e. 4 x line segment options to consider); and
- Option 3: Lubango – Cahama – Omatando (i.e. 4 x line segment options to consider).

4.2.3 Preferred corridor

A rigorous process identified a range of potential route line segments within each of the three base corridor options. Route line segment alternatives were identified to connect to the various substations per transmission corridor. A total of eleven (11) line segments (A1, A2, B1, B2, C1, C2, C3, D1, D2, E1 and E2) were identified for the three transmission corridors. These are shown in Figure 4.3.

In terms of the segment options, segments A1 and A2 (Lubango – Cahama) are common to all three corridor options. The line segments per corridor option are as follows:

- Option 1: Lubango – Cahama (A1 and A2) – Baynes (B1 and B2) – Kunene (C1, C2 and C3)
- Option 2: Lubango – Cahama (A1 and A2) – Kunene (D1 and D2)
- Option 3: Lubango – Cahama (A1 and A2) – Omatando (E1 and E2)

A Multi-Criteria Decision Making (MCDM) process was undertaken to determine the preferred corridor from a technical, environmental and social perspective. The MCDM approach is useful in that it is a transparent and interactive process that can be used for optimal site and/or route selection. It is aimed at supporting decision-makers who are faced with making numerous, and potentially conflicting, evaluations on a range of feasible alternatives.

The MCDM workshop, to determine the preferred transmission line corridor option, was held on 30 and 31 October 2017. The workshop was attended by representatives from the DBSA, SAPP CC, RNT, NamPower, and technical, environmental and social teams from Aurecon, to ensure that all relevant information, local knowledge and transmission expertise was considered in the corridor selection, and that key project stakeholders agreed on the way forward.

The workshop participants assessed the alternative corridor options using agreed criteria, as discussed below.

4.2.3.1 Criteria for route selection

The route selection criteria were chosen based on a broad definition of sustainability, which encompasses the technical (including financial), environmental and social criteria, outlined below. The only criteria that were considered in the route selection process were those that differentiated the route options and line segments from one another.

In the instance where a criterion would have applied to all routes equally, due either to the limited data available and/or the similarity of these aspects across the study area (for example potential heritage resources), these criteria were not included in the MCDM process as they did not assist in determining a preference for one corridor option over another. In addition, aspects that are similar across the study area, such as climate change, income and livelihoods, gender and other vulnerable groups' issues, and indigenous people populations, were not assessed in the MCDM process.

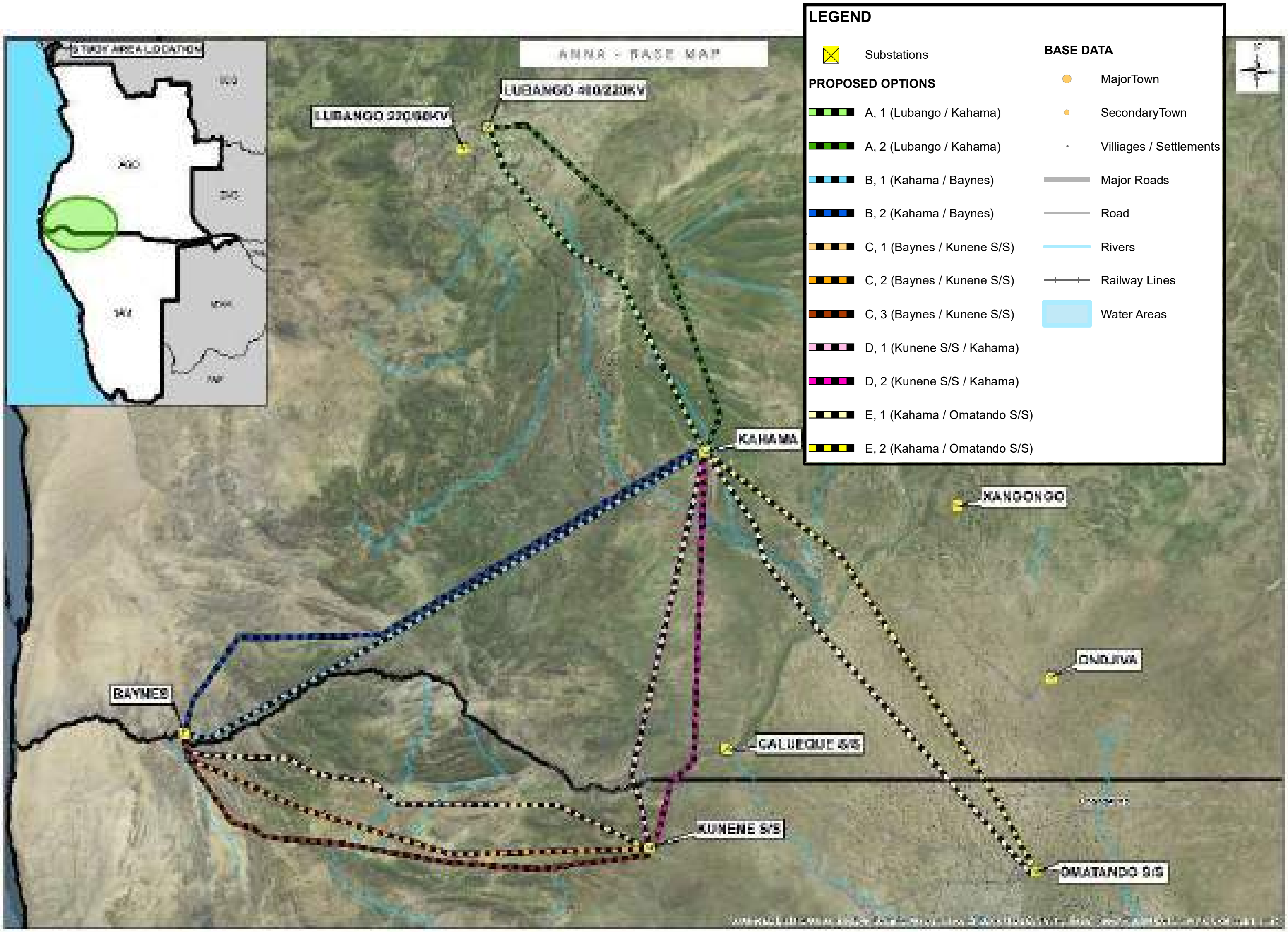

Figure 4.3: Identified transmission line segment alternatives per corridor option

The criteria that were considered in each category are detailed in Table 4.1.

Table 4.1: MCDM criteria

Category		Criteria	Description
Corridor option	Technical (Including Financial)	Tech 1. Losses	Technical losses
		Tech 2. Transfer capability	Measured in MW (under specific conditions)
		Tech 3. Length / Cost	Line length and associated cost
		Tech 4. Reliability (n-1)	Ability to transfer power under n-1 contingency
	Strategic	Str 1: Pre-empting Baynes investment	Pre-empting Baynes investment
Line route	Environmental	Env 1. Biodiversity	Aquatic and terrestrial ecology; Ecological services
		Env 2. Protected areas	Status of the Protected Areas; Bird & Bat important areas
	Social	Soc 1. Compensation	Villages/settlements or other assets that will require resettlement or compensation
		Soc 2. Social	Proximity to existing large villages or towns that will remain; Distance to communities
		Soc 3. Landscape	Potential visibility for sensitive receptors
	Slope	Slope 1: Constructability	Avoid steep slopes greater than 1:10

4.2.3.2 MCDM methodology and outcome

A cascaded MCDM approach was followed whereby the three corridor options and the 11 line segments were subjected to the MCDM scoring process. The corridor options were rated first against the technical and strategic criteria to determine the preliminary preferred corridor option. Thereafter, these 11 segments were rated against the environmental, social and slope criteria. In all instances, this was done on a one-to-one basis. This process was repeated until all line segments had been compared against one another. All criteria were rated without considering mitigation measures.

Corridor Option 3 was marginally preferred over Option 2 from a technical and strategic perspective. But further comparison with other criteria revealed that Option 2 was preferred from an environmental, social and slope perspective. Therefore, these overall scores were added together and converted to a score out of 100 percent. The results are shown in Table 4.2.

Table 4.2: Overall preference percentage scores for the corridor options

	Overall Technical	Overall Strategic	Overall Enviro	Overall Social	Overall Slope	Overall combined preference
Option 1	14%	71%	18%	24%	9%	19.2%
Option 2	42%	14%	37%	61%	45%	43.6%
Option 3	44%	14%	46%	15%	45%	37.2%

Thus, when factoring all the criteria together, Corridor Option 2, comprising line segments A2, D2 (as shown on Figure 4.3), which links Lubango to Cahama and Kunene, is the preferred corridor.

4.2.4 Routing alternatives for preferred corridor

Whilst the conceptual corridor (Option 2), chosen through the MCDM workshop in October 2017, was suitable for the initial high-level planning for the project, it lacks the alignment detail required for the environmental assessment process. Thus, Aurecon embarked on a route identification process for the proposed transmission line and developed a number of potential route alignments through analysis of satellite imagery and through the consideration of various criteria.

4.2.4.1 Criteria for route alignment selection

The criteria that were considered in each category are detailed in Table 4.3.

Table 4.3: MCDM criteria for route alignment

Category	Criterion	Description
Technical	1. Length / Cost	Line length and associated cost
	2. Proximity to other infrastructure	Proximity to roads and other linear infrastructure. These could be used for access during construction and maintenance.
Biophysical	3.Impact on untransformed habitat	On a landscape level, how much of the route is natural vs. transformed (ploughed, covered by infrastructure, settlements, etc.)? NB: This implies only that the habitat is largely natural, but not necessarily that its processes are untransformed. Many areas occupied by indigenous people may appear "pristine", but may be heavily overgrazed.
	4. Wetlands	Which portions of the route cross major wetlands / inundated areas and watercourses / rivers?
Social	5. Social impact	Which portions of the route traverse settlements, housing, farming areas, and other human infrastructure that would be affected? How many people would need to be resettled (relative to other routes)? This affects the potential size of compensation for lost assets, economic displacement impacts, disruption to social processes and other social impacts.

Due to the fixed location of the Cahama substation near the middle of the study area, and the significant social constraints of crossing the Lubango urban area to the Lubango substation, route identification was undertaken in three portions:

- Kunene - Cahama: Kunene substation to Cahama substation (5 options);
- Cahama - Lubango: Cahama substation to the outskirts of the Lubango urban area (3 options); and
- Lubango Urban to Lubango substation (8 options).

A similar multi-disciplinary MCDM approach to that described in Section 4.2.3, was undertaken to determine the preferred route alignment. The MCDM workshop for the line route identification took place on 6 July 2018 with representatives from DBSA, SAPP CC, RNT, NamPower and environmental, social and technical expert team members.

The line route options considered in this MCDM for the Namibian portion of the line and the southern portion of Angola, up to Cahama substation, are shown in Figure 4.4.

4.2.4.2 MCDM outcome

The overall outcome of the MCDM workshop for the transmission line routing was as follows:

- For the portion of the transmission line from Kunene Substation to Cahama Substation, K-C_B_2 is the preferred alternative (Figure 4.4).
- For the portion of the transmission line from Cahama Substation to Lubango Substation, C-L_A_1 is the preferred alternative (Figure 4.5).
- For the Lubango Urban portion of the transmission line, LU_A_1.1 is the only feasible alternative route (Figure 4.6).

These preferred sections are collectively the preferred route described in this report and the basis for Figure 1.1.

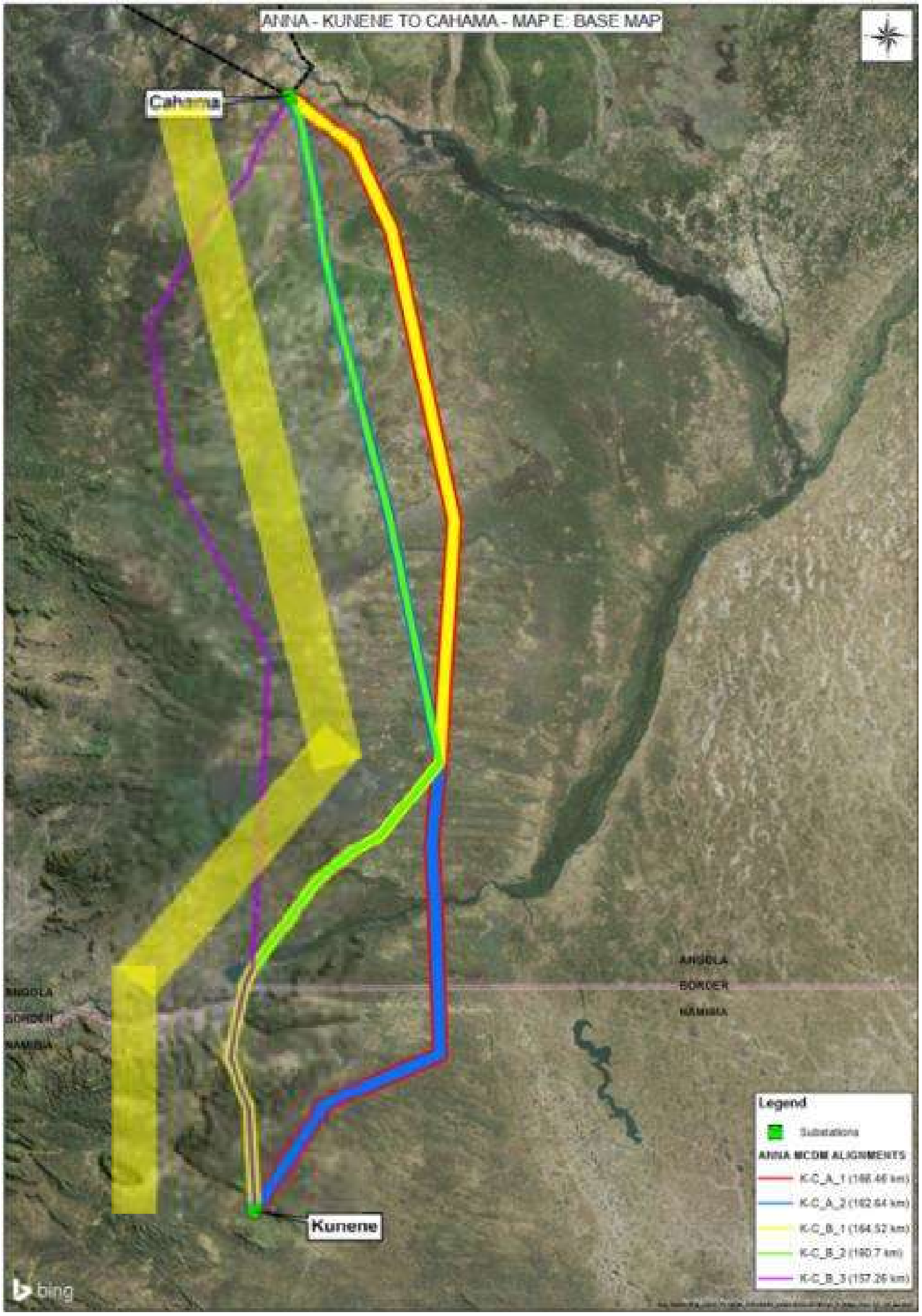

Figure 4.4: Preferred route from Kunene Substation to Cahama Substation (yellow highlight)

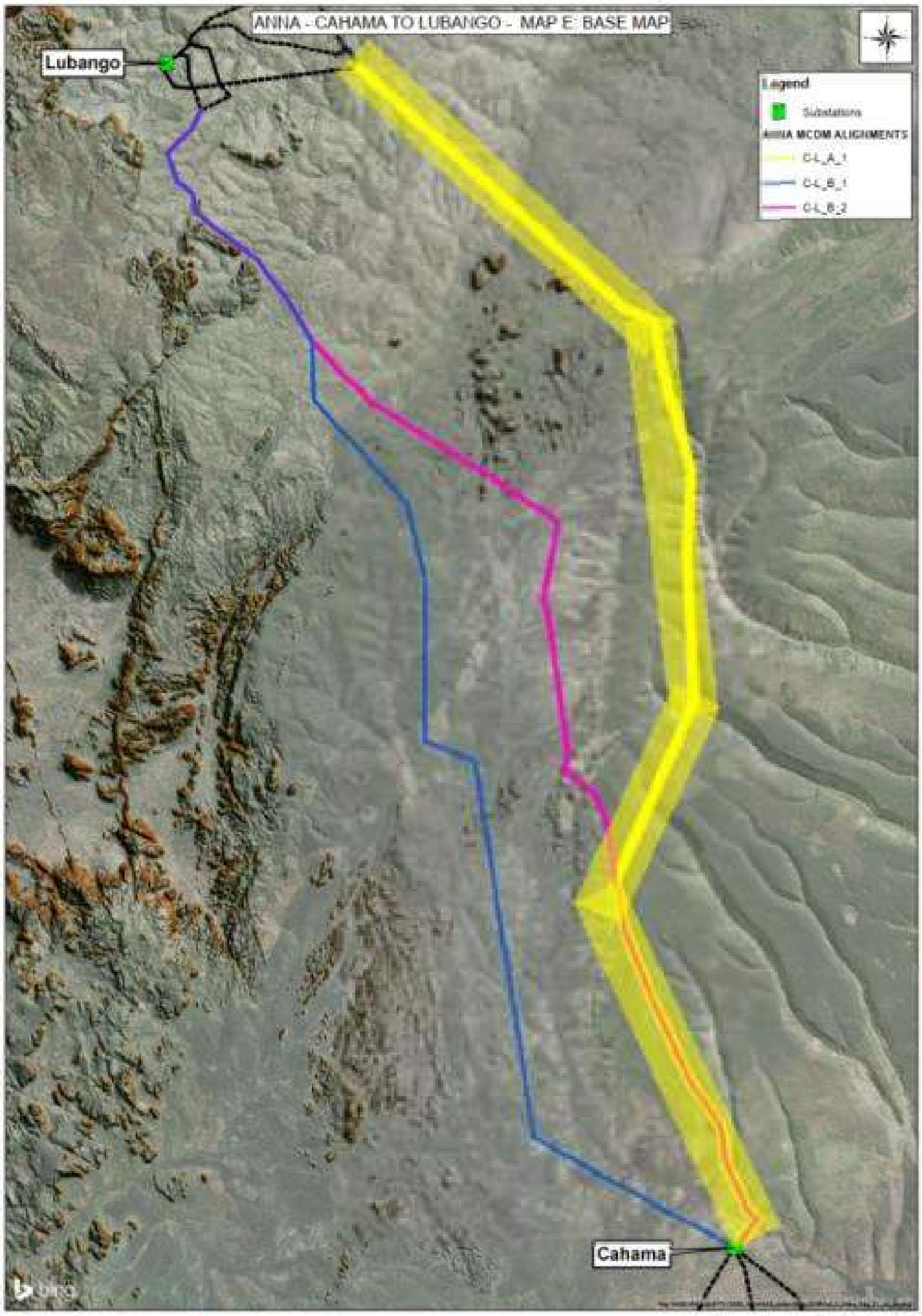

Figure 4.5: Preferred route from Cahama Substation to Lubango (yellow highlight)

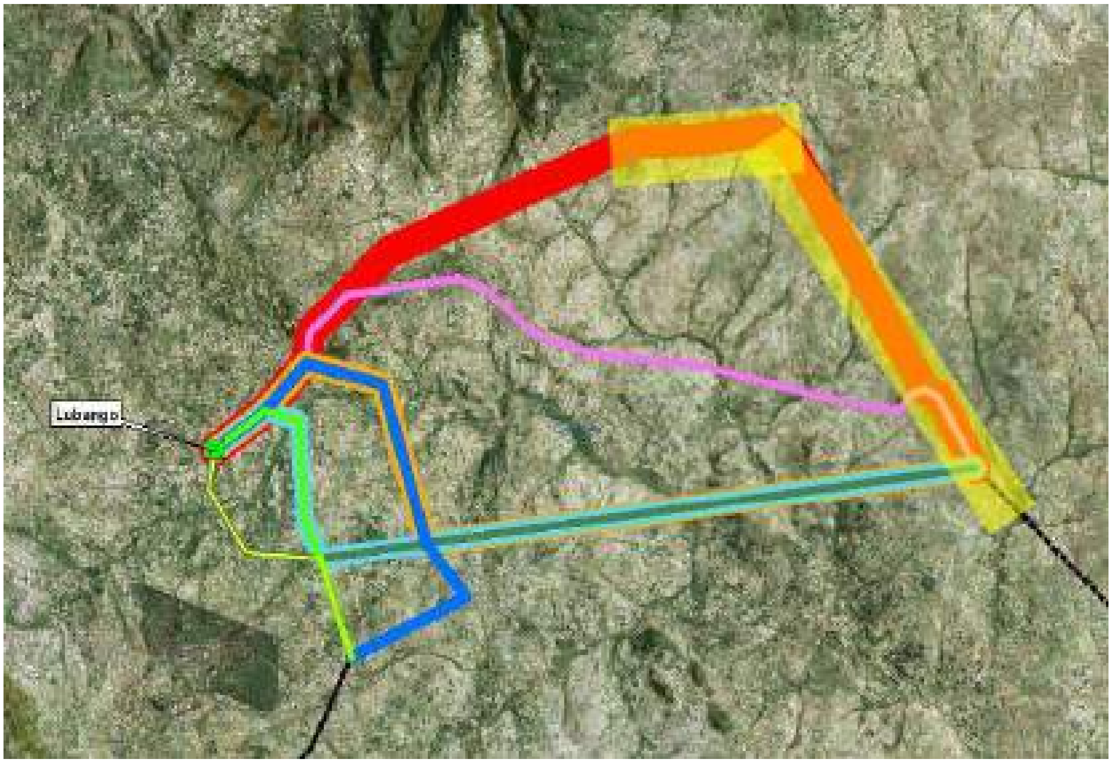

Figure 4.6: Preferred route for the Lubango Urban Section (yellow highlight)

4.3 Scoping Phase

Scoping in the ESIA process is the procedure used to improve the efficiency and focus of the ESIA Phase. This phase is not contemplated in Angolan Environmental legislation, but is part of internationally recommended best practice. The Scoping Phase allows for the more significant issues and impacts that require detailed assessment, to be identified, based on available knowledge of the project activities and the receiving environment. It also focuses the assessment process by refining the alternatives which, in this case, was already done during the previous phase of planning. An understanding of the prevailing national and international regulatory context also ensures that the ESIA meets the requirements of decision-makers and potential funders. The approach to the ESIA was captured in the Terms of Reference for the ESIA, included in the Scoping Report (SR). The scoping process also allows for stakeholder engagement, so that they may have input into any aspect of the reporting.

The SR was sent to DNPAIA, and was issued to the Cunene and Huíla Provincial Administrations as part of the stakeholder engagement. The Provincial Administrations also received a set of 50 pamphlets (NTS) and participation forms to be distributed to each concerned municipality (Huíla – Lubango, Chibia and Chiange; Cunene - Cahama and Curoca). Any comments received will be included and addressed in the ESIA report (to date no comment has been received).

4.4 Environmental and Social Impact Assessment Phase

The ESIA Phase assesses the significance of the potential impacts identified during scoping. The assessment process aims to identify mitigation measures that will assist in either avoiding or reducing any negative environmental and social impacts, and enhancing positive effects. The stakeholder engagement process allows the findings of the assessment to be presented to stakeholders and ensures that comments are incorporated into the final report, in order to support decision-making.

The objectives of an ESIA are therefore as follows:

- To ensure that environmental and social considerations are explicitly addressed and incorporated into the decision-making process;
- To anticipate and avoid, optimize or offset the adverse significant biophysical, social and other relevant effects of development proposals;
- To optimize positive impacts of the project with an overall net positive impact intended for this project;
- To ensure protection of the productivity and capacity of natural systems and the ecological processes which maintain their functions; and
- To promote development that is environmentally and socially responsible, assists in meeting sustainable development goals and optimizes resource use and management opportunities.

In addition to the ESIA Report (Volume II), which documents the findings of the assessment, the ESMP (Volume III) serves as a framework within which the environmental and social risks and liabilities identified during the ESIA process, are managed for the lifecycle of the project. These reports have been prepared in accordance with the Terms of Reference (ToR) specified in the Scoping Phase and have been undertaken in compliance with the Angolan EIA Regulations, as well aligning with the IFC's Performance Standards for Environmental and Social Sustainability (IFC, 2012) and the DBSA's Environmental and Social Safeguard Standards (DBSA, 2018). A financial safeguard gap analysis identifies any gaps and potential limitations of the study, as well as post-ESIA requirements that are necessary to meet these standards (refer to Section 8.7).

The ESIA Report will be circulated for stakeholder engagement and will be presented in a number of community and public meetings. After receiving DNPAIA's inputs and conditions for the Installation Environmental Licence, the ESIA documentation will be revised to take into account all the comments received and submitted to SAPP CC and DBSA, so that the project can proceed.

4.4.1 Environmental and social impact assessment reporting

The ESIA process has been undertaken in accordance with the Terms of Reference for the ESIA (Section 8 of the Scoping Report). This ToR was designed to ensure compliance with the Angolan EIA Regulations as well as the IFC PS (2012) and the DBSA ESSS (2018). The main objective of the Environmental Impact Assessment (EIA) process in Angola is to impartially identify and evaluate the environmental impacts associated with the project, define the appropriate measures to reduce expected impacts, and establish a monitoring plan to assess the evolution of critical environmental issues.

The complete ESIA Report includes a number of components aimed at deepening and assessing the information gathered in the previous phase. A team of specialists was used throughout the process to evaluate information and provide recommendations in terms of their relevant areas of expertise.

1: Project Need, Description, Alternatives and Regulatory Framework

The assessment needs to show that the project is a justifiable activity with respect to the environmental and social impacts it may have. This section explores such aspects and considers the project level alternatives such as design, technology and layout. A description of the regulatory framework for the activity, as relevant to the social and biophysical environment, is also required.

A detailed description of the components of the project is also provided in this section, which was compiled with the assistance of the project's technical team.

2: Characterisation of the Study Area

As a legal requirement, the project's area of direct and indirect influence was defined, justified and mapped. These areas are crucial to define the significance of the impacts at a later stage of the ESIA.

This phase entails the assessment of the current conditions of the overall environment/area that will be influenced by the project. The analysis, characterisation and evaluation of the current situation of the study area is divided into three main sections – 1. Physical; 2. Biological; and 3. Socio-economic and Cultural environment, as per Angolan EIA Regulations. This characterisation includes the specialist studies described in Section 4.4.2.

3: Environmental and Social Impact Assessment and Mitigation Measures

The main objective of the ESIA process is to identify and evaluate the impacts (positive and negative, direct and indirect) associated with the execution of the project (implementation and operating phases) with regards to the biophysical, environmental, socio-economic and cultural components of the potentially affected areas, and to propose the appropriate measures to enhance and maximise the positive impacts, and avoid, mitigate, minimise or offset the negative impacts.

The significance of the impacts identified during the Scoping Phase was assessed during the ESIA Phase and the specialists recommended measures to mitigate the impacts which were included and operationalised in an Environmental and Social Management Plan (ESMP - Volume III).

4: Environmental and Social Management Plan

Although the Environmental and Social Management Plan (ESMP) is not a legal requirement in Angola, an ESMP was prepared for the control and remediation of residual impacts during construction and operation of all aspects of the envisaged project. The ESMP format is that of a framework detailing measures required to ensure social and environmental safeguarding. ESMP inputs derive from the various specialist studies.

The ESMP will be used to enforce the mitigation measures and ensure that the impacts are properly managed. The ESMP meets the requirements of Angolan legislation and IFC and DBSA safeguards, will be in line with the mitigation hierarchy and ensure that the project implementation addresses potential project environmental and social risks and impacts.

The ESMP details project measures, actions and implementation timeframes required to ensure compliance with local legislation and international finance institution requirements (DBSA, IFC, etc.). As required in the DBSA ESSS (2018), the ESMP provides a summary of project environmental and social risks and impacts, outlines material performance improvement measures, actions and timeframes necessary to avoid, minimise, reduce or mitigate identified risks, and addresses any identified gaps. The ESMP also describes, to the level of current project design available, the required operational policies and manuals, management systems, procedures, practices and estimated capital investments proposed to develop and implement the measures and actions anticipated to enhance project environmental and social performance. This includes procedures for screening climate change vulnerability, greenhouse gas emissions, and for natural capital vulnerability, where relevant.

The ESMP summarises the organisational structure that will ensure its implementation and outlines the budget for the actions required. The ESMP forms the basis for monitoring of the project's environmental and social performance, including all requirements, performance targets, relevant completion details, timeframes and systems to be put in place. The ESMP defines the mechanisms to interactively review, monitor and report on progress in achieving the identified measures and actions.

The ESMP was compiled through close collaboration between the project team and the ESIA specialists, to ensure that they provide integrated and comprehensive frameworks within which to achieve all the agreed management objectives. The ESMP covers the full range of generic and project-specific impacts and associated mitigation measures, as identified during the ESIA process, as well as industry best practice.

5: Non-technical Report

An NTS of the ESIA report was compiled for circulation in the Stakeholder Engagement phase (Volume I). This Non-Technical Report, written in a style accessible to the general public, summarizes the contents of the ESIA report and describes the project and the consequences of its implementation, includes all questions assessed, as well as conclusions and recommendations.

4.4.2 Specialist studies

During the ESIA phase, the project team analysed, characterised and evaluated the current situation of the project's area of influence. This analysis assessed the current state of the various environmental aspects that were considered likely to be influenced, directly or indirectly, by the implementation of the project.

This characterisation is based on data gathered from literature, from consultations with various entities, from websites made available by various institutions and from field work to confirm the information collected. The assessment of the current situation substantiates the prediction and evaluation of impacts generated by the implementation of the project.

The identification of relevant specialist disciplines is based on the nature of the project and the receiving environment and are shown in Table 1.3. The specialists' assessments considered the national legislative standards for Angola, as well as the IFC PS (2012) and the DBSA ESSS (2018). All specialists (except those involved in the resettlement component) were required to apply the following generic methodology:

- Undertake a review of all new information emanating from the Scoping Phase of the project, including project information, design iterations and information or comments from Interested and Affected Parties (I&APs).
- Review aerial imagery (Light Detection and Ranging (LiDAR), satellite, etc.) of the proposed transmission corridor to identify environmental features, relevant to each field of study, and identify specific locations for verification during fieldwork.
- Consult with respective authorities, where relevant to each discipline.
- Compile a focussed and relevant description of all baseline characteristics and conditions of the receiving environment (e.g. site and/or surrounding land uses within the Potentially Affected Area) in relation to each specialist's field of interest, based on all relevant available data, reports and maps, and information obtained from any fieldwork investigations.
- Where relevant, undertake additional field work/ research/ monitoring activities/ consultation for issues or sensitive elements of the receiving environment within each specialist's field of interest, to identify and evaluate possible impacts.
- Prepare a detailed assessment of the predicted impacts of the project and any of its selected alternatives on the receiving environment, or of the receiving environment on the project and any of its selected alternatives (namely the No-Go alternative), as per the methodology prescribed in Section 4.4.3. The impact assessment is to include:
  - An assessment of impacts for all phases of the lifecycle of the project, namely construction and operation phases[1], as well as the direct and indirect impacts;
  - An assessment of the significance of each impact, before and after mitigation;
  - The identification of any residual risks that is expected to remain after implementation of design and planning mitigation; and
  - An assessment of the No-Go alternative.
  - The consideration and evaluation of the cumulative impacts in terms of other current and proposed activities in the area.
- Identify how the project aligns with UNDP SDGs, with reference to each specialist's discipline.
- Provide a detailed description of appropriate mitigation measures that can be adopted to reduce or avoid negative impacts, and improve positive impacts, for each phase of the project, where

[1] Since the projected lifespan of the proposed powerline is 30 years, and no decommissioning plan is available at this stage, only a conceptual assessment of decommissioning impacts can be done.

required, and the significance of impacts pre, and post, mitigation. Where applicable, the parameters and targets for mitigation, management and monitoring should be provided, and should include an estimation of associated costs. Where significant residual impacts remain, specialists must recommend compensation or offsets for such impacts (where technically and financially feasible). Furthermore, opportunities for creating net gains will be identified.

- Identify any assumptions and limitations that have informed the study, or gaps in knowledge that have become apparent.
- Provide a summary of succinct and practical recommendations based on mitigation measures identified to form the basis of the ESMP (Volume III).

4.4.3 Assessment methodology

This section outlines the proposed method for assessing the significance of the potential environmental and social impacts. The assessment of the significance of impacts for a proposed development is by its nature uncertain, and a matter of judgement. To deal with the uncertainty associated with judgement and to ensure repeatable results, Aurecon rates impacts using a standardised and internationally-recognised methodology adhering to International Standards Organization (ISO) 14001 and World Bank/IFC requirements. This methodology aligns with the Angolan EIA Regulations (Decree no. 51/2004, of 23 July).

For each predicted impact, criteria are ascribed. These include the magnitude (size or degree scale) which also includes the type of impact (either positive or negative), the duration (temporal scale) and the extent (spatial scale), as well as the probability (likelihood). The methodology is qualitative, whereby professional judgement is used to identify a rating for each criteria based on a seven-point scale (Table 4.4), and the significance is auto-generated quantitively using a spreadsheet through application of the calculations shown in Figure 4.7. The significance ratings are shown in Table 4.8.

Calculations

For each predicted impact, certain criteria are applied to establish the likely **significance** of the impact, firstly in the case of no mitigation being applied and then with the most effective mitigation measure(s) in place.

These criteria include the **magnitude** *(*size or degree scale), which also includes the **type** of impact, being either a positive or negative impact; the **duration** (temporal scale); and the **extent** (spatial scale). These numerical ratings are used in an equation whereby the **consequence** of the impact can be calculated. Consequence is calculated as follows:

Consequence = type x (intensity + duration + extent).

To calculate the significance of an impact, the **probability** (or likelihood) of that impact occurring is applied to the consequence.

Significance = consequence x probability

Depending on the numerical result, the impact would fall into a significance category as negligible, minor, moderate or major, and the type would be either positive or negative.

Figure 4.7: Calculation of significance

Table 4.4: Assessment criteria for the evaluation of impacts

Criteria	Numerical Rating	Category	Description
Duration	1	**Immediate**	Impact will self-remedy immediately
	2	**Brief**	Impact will not last longer than 1 year
	3	**Short term**	impact will last between 1 and 5 years
	4	**Medium term**	Impact will last between 5 and 10 years

Criteria	Numerical Rating	Category	Description
	5	**Long term**	Impact will last between 10 and 15 years
	6	**On-going**	Impact will last between 15 and 20 years
	7	**Permanent**	Impact may be permanent, or in excess of 20 years
Extent	1	**Very limited**	Impacts very limited / felt in isolated areas of the study area
	2	**Limited**	Impacts limited to specific parts of the study area
	3	**Local**	Impacts felt mostly throughout the study area
	4	**Municipal area**	Impacts felt outside the study area, at a municipal level
	5	**Regional**	Impacts felt outside the study area, at a regional / provincial level
	6	**National**	Impacts felt outside the study area, at a national level
	7	**International**	Impacts felt outside the study area, at an international level
Magnitude	1	**Negligible**	Natural and/ or social functions and/ or processes are negligibly altered
	2	**Very low**	Natural and/ or social functions and/ or processes are slightly altered
	3	**Low**	Natural and/ or social functions and/ or processes are somewhat altered
	4	**Moderate**	Natural and/ or social functions and/ or processes are moderately altered
	5	**High**	Natural and/ or social functions and/ or processes are notably altered
	6	**Very high**	Natural and/ or social functions and/ or processes are majorly altered
	7	**Extremely high**	Natural and/ or social functions and/ or processes are severely altered
Probability	1	**Highly unlikely / None**	Expected never to happen
	2	**Rare / improbable**	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
	3	**Unlikely**	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
	4	**Probable**	Has occurred here or elsewhere and could therefore occur
	5	**Likely**	The impact may occur
	6	**Almost certain / Highly probable**	It is most likely that the impact will occur
	7	**Certain / Definite**	There are sound scientific reasons to expect that the impact will definitely occur

When assessing impacts, broader considerations are also taken into account. These include the level of confidence in the assessment rating; the reversibility of the impact; and the irreplaceability of the resource as set out in Table 4.5, Table 4.6 and Table 4.7 respectively.

Table 4.5: Definition of confidence ratings

Category	Description
Low	Judgement is based on intuition
Medium	Determination is based on common sense and general knowledge
High	Substantive supportive data exists to verify the assessment

Table 4.6: Definition of reversibility ratings

Category	Description
Low	The affected environment will not be able to recover from the impact - permanently modified

Medium	The affected environment will only recover from the impact with significant intervention
High	The affected environmental will be able to recover from the impact

Table 4.7: Definition of resource irreplaceability ratings

Category	Description
Low	The resource is not damaged irreparably or is not scarce
Medium	The resource is damaged irreparably but is represented elsewhere
High	The resource is irreparably damaged and is not represented elsewhere

Table 4.8: Significance ratings

Significance	Negative	Positive
Negligible	Negligible - negative	Negligible - positive
Minor	Minor - negative	Minor - positive
Moderate	Moderate - negative	Moderate - positive
Major	Major - negative	Major - positive

4.4.4 Assumptions and limitations

In compiling the ESIA report, the following assumptions and limitations apply:

- It is assumed that the information provided by SAPP CC, RNT and NamPower is accurate, adequate and unbiased, and that no information that could change the outcome of the ESIA process has been withheld.
- This report is based on the most current information available, to date.
- The scope of this investigation is limited to identifying the potential environmental and social impacts associated with the section of the proposed 400 kV overhead transmission line within Angola, although there is a small part in Namibia. A separate report has been compiled for the Namibian component, which is subject to approval by the relevant Namibian authorities.
- Only the preferred transmission line route (that being the outcome of the screening and route selection process) has been assessed against the No-Go alternative, as described in Section 2.10.
- At the time of compiling this report, the project was still in conceptual design phase. Therefore, no detailed designs have been generated for the transmission line, including the placement of pylons. Detailed designs may be generated if the project receives an Environmental Installation Licence from the MINAMB. In addition, micro-siting, based on environmental and social specialist requirements findings (if applicable), may occur during the pre-construction phase.
- Specialist studies were not undertaken to inform the Scoping Phase, but rather during the ESIA Phase. Field work was undertaken in April 2019 and did not lead to any additional unexpected impacts over and above what was identified during scoping. Any limitations regarding seasonality of the fieldwork is discussed in the respective specialist reports, where relevant, and has been managed through comparison with other studies in the area.
- With regards to field work, the risk of landmines in the region restricted access to some parts of the proposed route. Selected sections of the line were surveyed in detail, where sensitivities were identified, using available aerial imagery (LiDAR data, Bing, GoogleEarth, etc.) and when on the ground. Those areas deemed not to be sensitive may only have been assessed using the aerial imagery, e.g. the social impact assessment specialist may identify areas that need not be visited as they are devoid of human habitation. Any limitations of this method will be clearly stated in the specialist assessments. In any event, due to the conceptual nature of design information available

at this stage of planning, it is recommended that a "walk-down" assessment of the route should be done after demining, and prior to construction, to confirm the accuracy of findings.

- Although it is desirable to quantify impact, this has not been possible in all instances, given the aforementioned limitations of the scale, and accessibility of, the study area corridor.
- Qualitative rather than quantitative evaluation of natural capital and ecosystem services was applied.
- The proposed transmission line route has not been demined. Therefore, access to the entire route was not possible, and specialists surveyed the route only as far as they were confident that the risk of landmines was negligible.
- The need and desirability of the project focusses strictly on the transmission line corridor and does not take into account the sources and mix of the power that will be transmitted. These strategic considerations had already been deliberated in Phase 1 of the project, to inform the decision to proceed with this phase of the project. Therefore, broader strategic environmental and social considerations, like national energy plans and contributions of different generation technologies, fall outside the scope of the ESIA.
- The climate change assessment has been undertaken to the scale of Scope 1 emissions (direct emissions from owned or controlled sources) in base units of CO_2e and done to the analysis Tier 1 level. This is due to the limitations on available information at this stage of project design. Operational and decommissioning GHG emissions have not been calculated due to the level of information available and uncertainty at this stage and are expected to be limited during operation due to the nature of the infrastructure and maintenance activities required (refer to Table 4.9).

Table 4.9: Activity data availability for operational phase

Scope 1: Mobile combustion emissions from vehicles and equipment	Availability
Scope 1: Mobile combustion emissions from transporting materials and personnel to site	No activity data is available. Requires information of vehicle used for maintenance or responding to breakdown, distances travelled, maintenance schedules, etc.
Scope 1: Fugitive emissions	No detailed activity data available on equipment and technology applications. With specific reference to insulation and interruption applications. Fugitive emissions will be dependent on the type and number of equipment installed and used during operations. This information was not available.
Scope 2: Emissions from the consumption electricity for maintenance	Not available.

- Impacts that have been scoped out between the Scoping and ESIA phases for the Operation phase of the project, are as follows:
  - Corona Effect – the servitude of 55 m is considered adequate to mitigate this effect.
  - Impact on land value during operation has not been assessed, as in Angola, all land belongs to the State and is therefore not for sale on the property market.
  - Impact on utilities, e.g. electromagnetic interference and aircraft safety, has been scoped out and the relevant authorities have been consulted in this regard (Annexure D).

4.5 Stakeholder engagement process

4.5.1 Overview

The objectives of stakeholder engagement[1] are to inform the public about the project on an ongoing basis, understand their concerns related to the project at an early stage, obtain local knowledge about the area and provide review opportunities at key stages in the process for them to provide comments in relation to issues and concerns. The following documents have been used to guide the stakeholder engagement process:

- Regulations for Public Consultation for projects subjected to EIA process (Executive Decree no. 87/12 of 24 February);
- DBSA ESSS2: Stakeholder Engagement and Information Disclosure;
- DBSA ESSS3: Gender Mainstreaming;
- DBSA ESSS4: Indigenous Peoples;
- DBSA ESSS7: Community Health and Safety;
- IFC PS1: Assessment and Management of Environmental and Social Risks and Impacts;
- IFC PS4: Community Health, Safety and Security;
- IFC PS7: Indigenous Peoples;
- IFC (2007): Manual for Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets; and
- SAPP (2018b): Final Environmental and Social Management Framework for the Southern African Power Pool.

A Stakeholder Engagement Plan (SEP) has been developed as a stand-alone document to guide the engagements of the various parties undertaking activities at different stages of the project lifecycle. This SEP is presented as Annexure A of the ESMP (Volume III). The proposed ESIA stakeholder engagement is summarised in Section 4.5.2. Future engagements are described in Section 4.5.3, which includes a Grievance Mechanism that should be implemented from the ESIA Phase onwards.

Other standalone documents have been produced to fulfil the requirements of the IFC's PSs and DBSA's ESSS. These plans are presented schematically in Figure 4.8:

1 Referred to as Public Consultation in Angolan EIA regulations

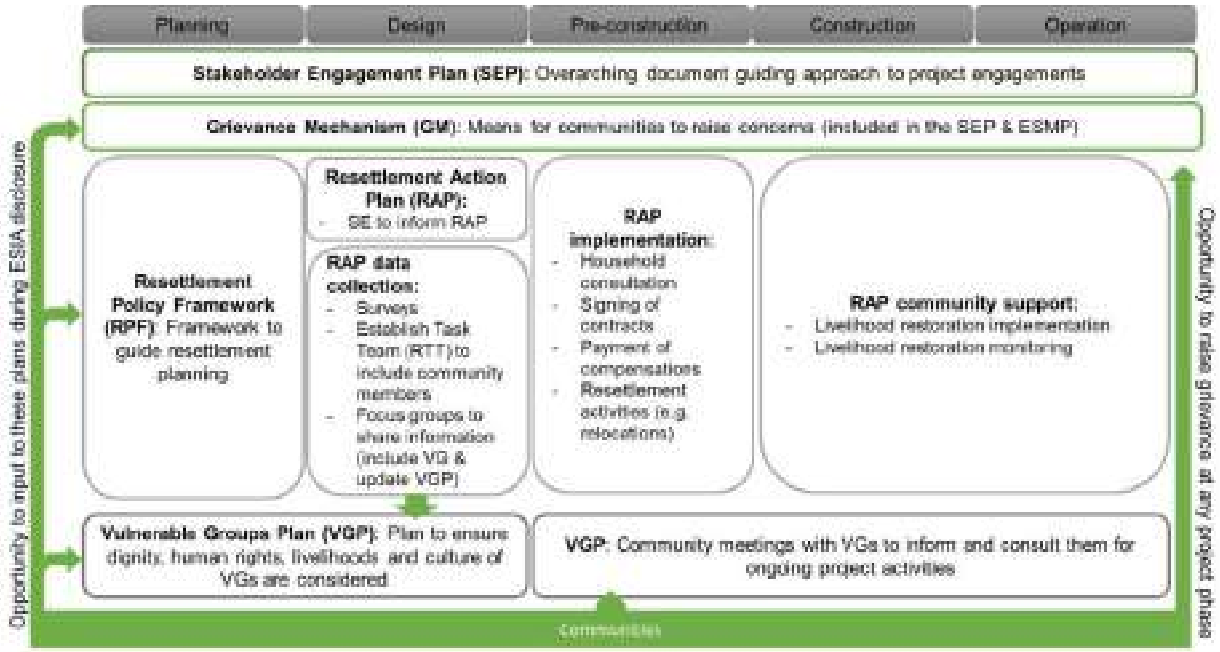

Figure 4.8: Stakeholder engagement opportunities during project lifecycle

4.5.2 ESIA stakeholder engagement

4.5.2.1 Stakeholder engagement activities

As described in Section 3.1.1, the Regulations for Public Consultation for projects subjected to an EIA process (Executive Decree no. 87/12 of 24 February) state that DNPAIA is the entity responsible for the EIA's public participation, after the EIA report has been submitted to this authority for evaluation.

Public consultation is undertaken by means of a public session, at which a panel is present, composed 3 DNPAIA representatives, the proponent and a representation of the Environmental and Social team that prepared the EIA. The minutes of the public session are prepared by DNPAIA representatives and serve as a basis for the technical advice on the Environmental Licencing of the project. Additionally, the disclosure of the public session is DNPAIA/MINAMB's responsibility.

The timeframes for public consultation/comment may not be shorter than 5 days, or more than 10 days and public participation during the public session may be verbal or written and all questions raised must be addressed orally during the session. The project's proponent is responsible for all costs associated with the public consultation.

However, these regulations (Executive Decree no. 87/12 of 24 February) do not address the full extend and complexity of the requisites derived from the fact that ANNA project is financed by international lenders and, as such, the strategy included in the SEP aims to close the gaps and address IFC and DBSA's requirements. The SEP, in conjunction with the Vulnerable Group Plan (refer to Section 4.5.3.3), aims to ensure that all potentially interested and affected parties are consulted in a meaningful and structured way, and that the needs and expectations of every sector of the population is captured, including the most vulnerable (women, indigenous peoples, disabled, elderly, etc.), and addressed.

The public had two opportunities to participate in the project, in accordance with the requirements of the international financial institution safeguards: during the field work social engagement in April 2019, and after the finalisation of the Scoping Report. The activities to be undertaken during the ESIA stakeholder engagement process are discussed below.

1: Stakeholder identification

The objective is to identify and register the key stakeholders that will be directly affected by the project, or entities that have a jurisdictional mandate governing any aspect on which the project may exert influence. During this phase, the Impact Assessment Authority (DNPAIA[1]) within the Angolan Ministry of Environment (Ministério do Ambiente - MINAMB) was consulted and asked which other parties should be included on the stakeholder registry. The key stakeholders, referred to as I&APs, are continually captured in a stakeholder registry/database.

The database can also be used to code what are termed “key stakeholders”. These include the authorities, land users, I&APs who act as sectoral representatives, and individuals who have previously expressed sentiments (positive or negative) regarding the area and environmental processes. Land user details can only be determined upon consultation with authority structures in the area and after site visits have been conducted. Again, site visits are dependent on sites being declared safe after demining.

A linear project such as this may have impacts on people beyond the immediately-affected stakeholders, known as secondary stakeholders. Secondary stakeholders can be identified by means of newspaper advertisements, radio notices and word-of-mouth.

2: Notification of project and scoping disclosure

Notification of the project was done by initially contacting all relevant local governmental institutions. Initial contacts were made with local authorities to identify traditional authorities. After traditional authorities were identified, initial meetings were also arranged with them. During these engagements, the proposed project was presented, other stakeholders were identified for inclusion in the I&AP database, and further information was gathered to determine what the most appropriate communication media would be in remote areas and how to communicate with the indigenous peoples.

A one-page pamphlet was compiled for the scoping phase, containing information about the project in a non-technical format, as well as a participation form. The same strategy will be applied in the ESIA phase. Although it is recognised that these documents require a level of literacy that is not present in the study area for the majority of the population (ascertained during field interviews), the importance of the local community leaders/opinion-makers (such as public servants/administrative officials, traditional leaders (Sobas and Seculos), teachers, priests/pastors, nurses, doctors, large-scale farmers, etc.) to convey and make the project and ESIA information more accessible for the majority of the population, was made clear. The engagement of, and collaboration with, these local leaders is essential to ensure that all stages of the project development are transposed to the affected communities. These local leaders will also act as receivers and transmitters of comments and concerns for the responsible entities (RNT, SAPP CC, Environmental Ministry, contractor(s) during construction, etc.).

3: Disclosure of the ESIA documentation

An NTS of the ESIA document, as required by Angolan EIA regulations, has also been compiled. Numerous potential I&APs reside in highly remote and rural locations. In this instance, engagement will primarily take place through meetings with the local authorities, and focal point meetings with community and traditional leaders. The information pamphlets are sent to the local authorities, namely the provincial, municipal and communal administrations, who in turn make these available to those potentially concerned and/or interested.

Newspaper advertisements are proposed to be placed in Jornal de Angola and Novo Jornal (both national newspapers) to inform the public of the project and of the availability of project information, for a period of two weeks during the ESIA phase. Site notices will also be placed in conspicuous places, and in the populous, urban stretches of the proposed alignment corridor. The posters provide the same information as contained in the newspaper and radio advertisements, and will include a layout map of the project.

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1 Direcção Nacional de Prevenção e Avaliação de Impactes Ambientais - National Direction for Prevention and Assessment of Environmental Impacts

To ensure that adequate stakeholder engagement takes place for the different stakeholder groups, three streams of engagement are proposed: (1) Engagement with authorities via post, or meetings; (2) Urban area engagements with site notices and newspaper advertisements, as these areas are densely inhabited and have a higher contingent of literate people; (3) Rural area engagements via community councils and traditional authority structures.

Meetings will be advertised via provincial and municipal authorities and identified communal and traditional authorities/leaders, radio advertisements, newspaper advertisements and site notices where possible. As stated previously, communication about the project is also recommended via engagement with traditional leaders (Sobas and Seculos) and though local leaders/opinion-makers, as their level of literacy allows them to convey the report information to the general population.

4: Comment periods and meetings

Following the compilation and submission of the ESIA Report to DNPAIA, a formalised comment period will commence. Notification of the availability of the ESIA documentation for review will be done using the same methods identified above. Stakeholders will be given the opportunity to express concerns and ask questions about the proposed project.

Authorities and I&APs are provided with at least ten (10) days to review the reports and will be invited to submit comments in writing to the Aurecon team.

Public meetings are organised through the provincial municipal, communal and traditional authorities. The format of the meeting will be tailored to the needs of the stakeholders attending the meeting. Meetings may take the format of a formal meeting via invitation, an open house meeting at a certain time, or an open day providing stakeholders an opportunity to attend at any time during an afternoon that suits their schedules.

5. Reporting of the stakeholder engagement issues and concerns

All comments, concerns and questions related to the project are recorded in a Comments and Response Report (CRR) wherein responses are provided. Where responses might need to be further researched or supplemented with further information, responses will be given as soon as this is available. Where necessary, an explanation will be provided of how comments will be used to revise the ESIA documentation.

Based on the CRR, a review of the ESIA documentation must be undertaken to reflect any new issues, and the means by which these issues are to be managed, monitored and reported on. Where and if required, stakeholder reporting mechanisms should be established in the ESMP to inform key stakeholder groups of progress and performance in relation to particular issues of concern throughout the construction phase.

Where possible, and if there is enough information available, the identified stakeholders will be mapped in a Geographical Information System (GIS). This information will support the development of future project activities, in particular the preparation of the resettlement and livelihood restoration plans (refer to Section 4.5.3.4), as well as to analyse the potentially-affected I&APs.

Stakeholder engagement is an ongoing and iterative process and should continue throughout the project lifecycle. It aims to ensure that a business venture remains in touch with the community it serves, as well as their needs and concerns. It also ensures that potential impacts continue to be identified and managed in a responsible fashion, thus lowering overall business risk and improving resilience.

4.5.2.2 Summary of issues and concerns identified to date

In the meetings conducted during the field work (in April 2019), local community representatives (Sobas) were quite active, although not very well informed of projects of this nature. The project was generally well received and positive attitudes towards the project have been confirmed, provided that the following key issues are safeguarded:

- **Involvement**: Communities should be heard when project decisions involve the allocation of land uses. Lack of access to electricity is a significant problem in the corridor identified both by municipality and communal administrations. It would thus be necessary to clearly communicate which zones will be electrified by the national grid expansion and which zones would further benefit by distribution infrastructure, and then to implement these plans. For areas not included in the national electrification plan, other forms of compensation should be considered.

- **Compensation**: Communities request to at least benefit from the presence of the infrastructure in their territory, not necessarily related to electricity, but based on lack of water, which is their main concern (primarily due to the current drought). Construction of water infrastructure (both for supplying the communities and for livestock) could be a significant compensation for communities.
- **Communication**: Communities request better communication to facilitate access to and the sharing of information, taking into account the linguistic differences and levels of community literacy. Direct meetings/conversations are the preferred communication means to engage people and to convey information for all levels of understanding within the population. The convening of these meetings should be done directly with the Traditional Authority and headmen, who have elected representatives as key contacts. Written communication is a less preferred method of communication.
- **Land occupation**: Even though there is no obvious conflict currently, there is a land occupation issue between Lubango and Cahama, between cattle owners and big organised farms (fazendas). Fazendas have been occupying transhumance areas/corridors used for the seasonal movement of cattle, limiting available space and routes to water and grazing areas. Therefore, the project should not put further pressure on these transhumance areas.

A noteworthy fact is that the Namibian component of the ANNA Project has already undertaken a set of stakeholder engagements as part of its legal ESIA process, and some pertinent issues were raised, which have also been considered in the project implementation for Angola. These reported issues, as discussed below, refer to gender and social matters relating to vulnerabilities and should be taken into consideration for future stakeholder engagement activities during the next project stages.

- The overall region presents high levels of unemployment and a lack of skills. A dedicated training programme, to ensure that the local population are enabled, must be implemented. Tailored technical assistance for women and other vulnerable groups, including the acquisition of the specialised technical skills required for this project, must be catered for. Project activities, such as the RAP survey, should employ and capacitate locals to fulfil the specific needs of these activities.
- Create awareness in both men and women, on how they can benefit from the project in order to become economically empowered.
- Corruption and nepotism in the allocation of jobs requires attention to ensure that no person is favoured due to their gender or ethnic group. The job allocation process must be transparent and independent. A large number of women are the heads of households, and it is therefore important for women to also benefit from project-related employment. The development of the Local Employment Plan (for the construction phase) must include:
  - The implementation of Affirmative Action as one of its requirements.
  - A defined quota stating the percentage of women and men that will be employed on the project.
  - Both women and men from the settlements along the transmission line should be given priority for low skilled jobs, and explicitly indicating, the quota for each gender.
  - A skills audit must occur before any construction activities commence, and notification of this provided via the local administrations and traditional heads, undertaken by independent consultants to ensure a transparent and independent process.
  - Special attention is required to prevent, or manage, unwanted pregnancies, especially when minors are involved:
  - Reports of unwanted pregnancies relating to construction workers, especially when the workers are from outside the project area, reinforces the need to use local workers where available.
  - An increase in teenage pregnancies caused by construction workers, who are known to target schools, can also occur and, as such, these age groups should be specifically targeted in training sessions.

- As these problems only become evident after a certain period of time, often only once construction is complete, it is frequently difficult to find and/or take action against the specific worker (e.g. underage women and women with unwanted pregnancies usually do not have any source of support, and the father should be equally accountable). Actions should be put in place to prevent these situations, as unwanted pregnancies lead to the increased vulnerability of an already-vulnerable group of people (i.e. unsupported women, who are unemployed, now have the additional burden of a child with no father, and children born with no father can be stigmatised).
- The construction camp(s) must be located away from schools and locations where women, and especially minors, often gather, such as markets, churches, etc.
- The Code of Conduct must include rules for engaging with locals, especially with underage girls. The disciplinary and legal implications for non-compliance with the Code of Conduct should be emphasised, for example dismissal or legal action if a rule is contravened (such as engaging with minors).

- The related risk of HIV/AIDS may not be accepted as a valid risk by the local communities and is sometimes associated with witchcraft practices. Dedicated awareness sessions to expand the communities' knowledge, and acceptance, of these issues, as well as increase their awareness of the risks, must be implemented.
- During construction, gender-based violence (GBV) is a possibility due to the presence of a non-local workforce and, as such, the project must ensure that all measures to prevent this are put in place. This includes the creation of an incident register, of incorporating dedicated GBV actions into the Grievance Mechanism (such as the protection of the anonymity of the victim), and making provision for the application for immediate disciplinary and legal actions to be taken upon the identification of such an occurrence. This also includes creating awareness amongst men to foster support of women who will be involved in the project, as well as about sexual harassment of both genders, including awareness of existing legal instruments on sexual harassment and rape.
- Rural populations (and specifically indigenous people), often do not send their children to school as per customary practices, and future engagement should therefore also address this issue.
- Villages are spatially dispersed and when a meeting is held, people from remote areas, and more specifically women, may not be able to travel to attend. It is therefore very important to consider and accommodate these challenges when planning engagement logistics.
- Where there are social workers and/or NGOs already operating in the area, the project should revert to their support and knowledge.
- Cultural obstacles may be encountered in the free expression of opinions, for example women may not speak in the presence of men, and may not disagree with them, or marginalised groups such as indigenous peoples or other minorities may not be able/allowed to convey their concerns. The importance of engaging separately with these groups must be considered.
- The Project should put in place measures to ensure that women contribute and benefit from the economic activities of the project. This includes the development of a Local Procurement Plan (for the construction phase) that considers how women-owned businesses will benefit from the procurement processes. This Plan should also ensure the equal and effective participation of women and men of the Procurement Board.
- The walk-down to identify sensitive resources for avoidance or compensation that is to be undertaken by social, heritage and ecology specialists, should include representatives from local communities who can advise on the locations of such resources. This will reduce impacts and also create a sense of inclusion and ownership of the process.

The CLO to be appointed, should include a female and a male, both indigenous if possible.

4.5.3 Future stakeholder engagement

4.5.3.1 Stakeholder Engagement Plan

The planned engagements with stakeholders during construction, operation, commissioning and beyond, detailed in the Stakeholder Engagement Plan (SEP – Annexure A of the ESMP), are summarised in Table 4.10 below.

Table 4.10: SEP implementation plan

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
SEP preparation					
Before project construction	SEP approved	PAPs engagement Key informant interviews Focus group meetings Community meetings	Inform Listen Consult	Proposed project information Announcement of construction activities (schedule, type of activities, risk and precautions)	PAPs Community representatives Project beneficiaries Interested parties
SEP implementation					
During project construction	SE progress report	Regular PAPs engagement Key informant interviews Focus group meetings Community meetings	Inform Consult	SEP progress Construction activities	PAPs Community representatives Project beneficiaries Interested parties
After project construction	SE construction report	PAPs engagement Key informant interviews Focus group meetings Community meetings	Inform	Construction completion SEP results during project construction	PAPs Community representatives Project beneficiaries Interested parties
During project operation	SE progress report	Regular PAPs engagement Key informant interviews Focus group meetings Community meetings	Inform Consult	SEP progress Operation activities	PAPs Community representatives Project beneficiaries Interested parties

4.5.3.2 Grievance mechanism

The IFC (2012) and DBSA (2019) require a Grievance Mechanism (GM) to receive and facilitate the resolution of affected communities' concerns and grievances about the project's environmental and social performance. The grievance mechanism has the affected communities as the primary user.

It seeks to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate and readily accessible, and at no cost and without retribution to the party that originated the issue or concern. The affected communities should be informed about the mechanism during the course of the stakeholder engagement process. The GM process is shown visually in Figure 4.9. More detail on the GM is included in both the SEP and the ESMP.

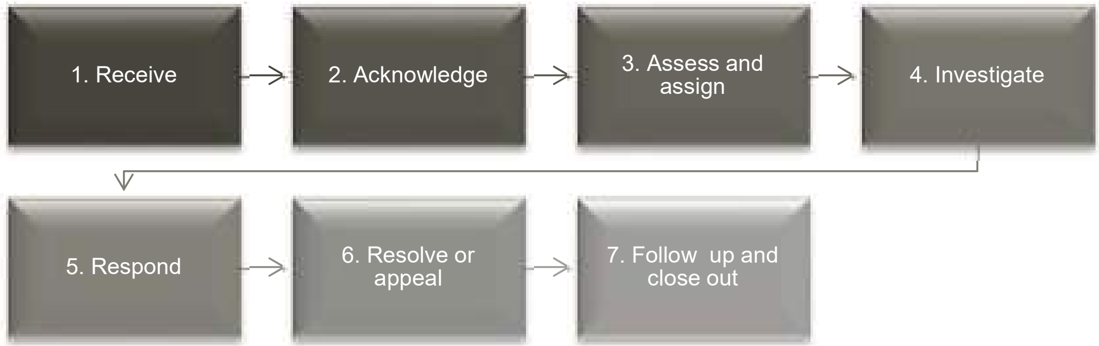


Figure 4.9: Grievance mechanism

4.5.3.3 Vulnerable Groups Plan

4.5.3.3.1 Purpose of the Vulnerable Groups Plan

In accordance to DBSA and IFC standards for socially sustainable development, a Vulnerable Groups Plan (VGP) must be developed when the ESIA identifies that vulnerable groups (VG) are present in the study area and might be negatively affected by the project.

The term "vulnerable groups" is used in a generic sense in this regard and refers to "*groups that experience a higher risk of poverty, social and economic exclusion than the general population such as indigenous peoples, migrants, disabled people, the homeless, women and children*" (DBSA, 2018). The IFC (2012) defines vulnerable alongside disadvantaged as those whose "*status may stem from an individual's or group's race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth, or other status. The client should also consider factors such as gender, age, ethnicity, culture, literacy, sickness, physical or mental disability, poverty or economic disadvantage, and dependence on unique natural resources*".

The IFC (2012) also identifies that 'Indigenous Peoples' may be more vulnerable to the adverse impacts associated with project development than non-indigenous communities. Indigenous Peoples in this regard is "*used in a generic sense to refer to a distinct social and cultural group possessing the following characteristics in varying degrees:*

- *Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;*
- *Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;*
- *Customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture; or*
- *A distinct language or dialect, often different from the official language or languages of the country or region in which they reside*".
- Migrants, disabled people/people with special needs and women.

As discussed in Section 5.4 (Socio-economic environment) the project has the potential to impact two ethnic minorities in Angola, considered by the international community as Indigenous People (IP) - the Mudimba (Himba) and the San. Such groups are susceptible to exclusion from, and/or unable to fully participate in, the mainstream consultation process and, as such, require specific measures and assistance to ensure adequate inclusion in project activities. In addition, women are particularly vulnerable within the project context. Thus, the applicability of DBSA and IFC Indigenous Peoples Standards (ESSS4 and PS7, respectively) are also relevant to the project, as well as the VGP.

The purpose of the VGP is to ensure inclusion of VG into the project implementation to enhance the social performance of the project with respect to dignity, human rights, aspirations, culture and natural resource-based livelihoods of VG and IP, in particular:

- To avoid adverse impacts on VG, minimise or compensate potential impacts on VG, broadening socio-economic benefits generated by the project;
- To ensure the Free, Prior, and Informed Consent (FPIC) of affected VG; and
- To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with VG affected by the project.

The action plan for the VGP is included in the ESMP, whilst the engagements are described below.

4.5.3.3.2 Proposed engagement

The proposed engagements in preparation and implementation of the VGP are summarised in Table 4.11.

Table 4.11: Engagement planned during VGP preparation and implementation

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
VGP preparation					
ESIA	Draft VGP	Community meetings (smaller engagements with women will be held after each meeting to enable women to participate fully in the process)	Inform, listen and consult	Disclose Draft VGP Collect inputs to create interest and promote more engagement for their participation in VGP implementation	VG VG representatives
		Public meetings			VG VG representatives other stakeholders
Final design (i.e. when number and location of VGP known)	VGP updated	Community meetings Site visits Discussions	Inform, listen and participate actively	Validate the final design solution (pylon location, Cahama substation, accesses and temporary camp(s) location) Validate updated VGP	VG VG representatives
VGP implementation					
Before project construction	VGP approved	Community meetings (smaller meetings with women will be held after each meeting to enable women to participate fully in the process)	Inform, listen and consult	VGP Announcement Construction activities (schedule, type of activities, risk and precautions)	VG VG representatives
During project construction	VGP progress report	Community meetings (smaller engagements with women will be held after each meeting to enable women to participate fully in the process)	Inform	VGP progress Construction activities	VG VG representatives
After project construction	VGP construction report	Community meetings (smaller engagements with women will be held after each meeting to enable women to participate fully in the process)	Inform	Construction completion VGP results during project construction	VG VG representatives

4.5.3.4 Resettlement Policy Framework

As described in Section 2.5.1, a RPF (Annexure C of the ESMP – Volume III), in the absence of a detailed design, sets out the framework for the RAP to be implemented prior to construction to compensate for physical or economic displacement of communities and their assets. As shown on Figure 4.8, the RPF is also subject to stakeholder engagement through the ESIA process, as well as post-ESIA activities, as resettlement should occur after the ESIA process but before construction commences. A participatory approach is therefore adopted as an ongoing strategy throughout the entire project cycle.

After ESIA disclosure, and once the SEP is approved, the stakeholder engagement during project implementation will occur at key stages. Table 4.12 provides the proposed engagement approach after the ESIA process has been completed, i.e. once the project commences with implementation.

Public participation and consultations take place through individual, group, or community meetings. Additionally, radio programs and other media forms may be used to further disseminate information. PAPs are consulted in the survey process; during resettlement and implementation of activities; and during the monitoring and evaluation process. The selection of means to consult, and to expand participation by PAPs and other stakeholders, will take into consideration literacy levels prevalent in affected communities, ethnicity and cultural aspects, as well as practical conditions such as distance.

A Resettlement Task Team (RTT) will be established as part of the resettlement planning process and will be responsible for planning and co-ordinating resettlement activities. The RTT will include representatives of resettlement-affected households, local authorities (statutory and customary), the RPF implementation team, as well as the Proponent. It includes representatives from the resettlement-affected communities and is the primary mechanism for engaging the resettlement-affected persons and communities.

4.5.3.4.1 Objectives of RPF/RAP stakeholder engagement

The objectives of formal consultations are to secure the participation of all people affected by resettlement throughout the planning and implementation phases, particularly in the following areas:

- Alternative project design;
- Assessment of project impacts;
- Resettlement strategy;
- Compensation rates and eligibility for entitlements;
- Choice of resettlement site and timing of relocation;
- Development opportunities and initiatives;
- Development of procedures for redressing grievances and resolving disputes;
- Mechanisms for monitoring and evaluation and for implementing corrective actions; and
- Information sharing: "*Information must be made accessible and understandable. Information should be translated into local dialects and indigenous languages and broadcast through media that is accessible to literate and non-literate individuals alike. Special efforts should be made to reach vulnerable groups*..."

Table 4.12: Engagement planned during resettlement

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
ESIA	ESIA Report, ESMP, SEP, VGP and RPF	Community meetings	Inform, listen, and consult	• Project disclosure and impact assessment	PACs, PAPs
RAP screening	Socio-economic Baseline	Focus group meetings, Community meetings and Key Informant Interviews	Inform, listen, and consult	• Identify all people affected by the project and all adverse impacts on their livelihoods associated with the project's land acquisition. • Share information on process, schedule, etc.	PACs, PAPs
RAP planning	Draft RAP including: Thematic Maps, Compensation Framework, Detailed Budget, Implementation Schedule, Legal framework for land acquisition and compensation, Description of resettlement assistance and restoration of livelihood activities, Grievance Redress Mechanism, Framework for monitoring, evaluation, and reporting	Census, Asset and Infrastructure Surveys, Community meetings and Key Informant Interviews	Inform, listen, and consult	• Thematic maps that identify such features as population settlements, infrastructure, soil composition, natural vegetation areas, water resources, and land use patterns. • A census that enumerates the affected people and registers them according to location. • An inventory of lost and affected assets, at household, enterprise and community level. • Socio-economic surveys and studies of all affected people (including seasonal, migrant and host populations), as necessary. • Analysis of surveys and studies to establish compensation parameters, to design appropriate income restoration and sustainable development initiatives, and to identify baseline monitoring indicators. • Consultation with affected populations regarding mitigation of effects as well as development opportunities. • The RAP compensation framework specifies all forms of asset ownership or usage rights among the population affected by the project, and the project's strategy for compensating them for the partial or complete loss of those assets. The compensation framework should include a description of the following: **1** Any compensation guidelines established by the host government; **2** In the absence of established guidelines, the methodology that the project sponsor will use to valuate losses; **3** The proposed types and levels of compensation to be paid; **4** Compensation and assistance eligibility criteria; and **5** How and when compensation will be paid. • The legal framework of a RAP describes all laws, decrees, policies and regulations relevant to the resettlement activities associated with a project.	PACs, PAPs

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
				• Where displacement is unavoidable, the sponsor should plan and execute resettlement as a development initiative that provides displaced persons with opportunities to participate in planning and implementing resettlement activities, as well as to restore and improve their livelihoods. • It is essential that all costs be estimated carefully and be included in a detailed RAP budget. Without an accurate assessment of the costs of land acquisition, compensation for lost assets and physical displacement, project planners cannot determine the real cost of project design alternatives such as alternative routes for power transmission lines or alternative sites for greenfield projects. The sponsor should itemise resettlement costs by categories of impact, entitlement, and other resettlement expenditures, including training, project management and monitoring. The results should be presented in a tabular form that illustrates expenditures over the life of the project. To ensure that all adverse impacts have been taken into account, budget line items should be checked against categories of adverse impacts and entitlements. The RAP budget must include a justification of all assumptions made in calculating compensation rates and other cost estimates, and must consider both physical and cost contingencies. • The RAP budget should be linked with a detailed implementation schedule for all key resettlement and rehabilitation activities. This schedule should, in turn, be synchronised with the project's schedule of civil works construction. Timing of the RAP field activities (consultation, census and survey implementation) is crucial: commencement of field activities too soon before the project begins may raise local expectations and attract newcomers, and commencement of activities too late after the project starts may interfere with project implementation. Planners should be attentive to the agricultural and employment cycles of affected people, and avoid scheduling key resettlement activities at times that may disrupt these cycles. Linking resettlement and construction schedules ensures that project managers place key resettlement activities on the same critical path as key project construction activities. Linking schedules in this way creates an imperative for co-ordinating resettlement with other project activities throughout the chain of project management. • The RAP must identify and provide details of the roles and responsibilities of all organisations, public or private, governmental or non-governmental, that will be responsible for resettlement activities.	

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
				• Regardless of its scale, involuntary resettlement inevitably gives rise to grievances among the affected population over issues ranging from rates of compensation and eligibility criteria, to the location of resettlement sites and the quality of services at those sites. Timely redress of such grievances is vital for the satisfactory implementation of resettlement and for the completion of the project on schedule. • The RAP must provide a coherent monitoring plan that identifies the organisational responsibilities, the methodology, and the schedule for monitoring and reporting. The three components of a monitoring plan should be performance monitoring, impact monitoring and completion audit. The scope of the monitoring plan should be commensurate with the scale and complexity of the RAP.	
RAP disclosure	Public Consultation and Participation Framework, and Public consultation log	Focus group meetings, Community meetings, Key Informant Interviews	Inform, listen, and consult	• Effective resettlement planning requires regular consultation with a wide range of project stakeholders. Early consultation helps to manage public expectations concerning the impact of a project and its expected benefits. Subsequent consultations provide opportunities for the sponsor and representatives of people affected by the project to negotiate compensation packages and eligibility requirements, resettlement assistance, and the timing of resettlement activities. Project consultation with people affected by resettlement is mandatory. • Promoting Participation - The sponsor must initiate and facilitate a series of consultations with project stakeholders throughout the planning and implementation of a RAP. The purpose of these consultations is to inform stakeholders about the project and its effects, and to provide opportunities for people to voice their concerns and to propose alternatives. • Formal consultations convened by the sponsor should include sponsor representatives, project managers, relevant government authorities, representatives of concerned NGOs, and members of both displaced and host communities. Discussions should centre around the effects of the project and measures to mitigate these effects. Because of discrimination within their societies, women and members of other vulnerable groups may find it difficult to defend their interests in a public forum. For this reason, it is important for project management, or the agencies responsible for RAP planning and implementation, to employ women and members of other vulnerable groups. These staff members can undertake outreach efforts, such as focus group consultation, to learn the concerns of vulnerable groups and convey them to resettlement planners and project managers.	PACs, PAPs

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
				• The objective of these consultations should be to secure the participation of all people affected by the project in their own resettlement planning and implementation,. • Regular consultation with affected people allows project management to monitor the adequacy and effectiveness of the RAP's compensation packages, livelihood restoration efforts, and development initiatives. • Depending on the size and scope of the project, the sponsor may employ a community liaison representative with a budget specifically for the facilitation and management of public consultation. Alternatively, the sponsor may contract a reputable and experienced NGO to provide the same services. How ever it chooses to manage information disclosure and public consultation, the sponsor must ensure that affected people have access to information about the project and the opportunities to seek redress of grievances relating to the project. • Project management must document its information disclosure and public consultation efforts. This documentation should identify who was consulted, what was discussed, and what follow-up was required.	
RAP implementation	Signed individual household dossiers, Tender documentation, Construction Management Plan and Livelihood Restoration Progress Report	Community meetings, Household meetings	Negotiate, discuss and agree	• Tendering and contracting of works; • Individual household sign-off; • Resettlement construction; • Participatory monitoring and oversight of the sign-off, construction and moves processes; • Moving of resettling households; • Final approvals and handover to statutory authorities; • Demolition of existing settlements; • Follow up with resettlement communities and households; and • Livelihood restoration and community development implementation, the key considerations of which are (Reddy, Smyth, & Steyn, 2015): - Replace project-affected households' existing livelihood activities as a first priority, to provide a baseline safety net to all households to ensure a minimum standard of living. - Land-for-land replacement is the most effective livelihood restoration intervention, but this can be particularly challenging where the project is acquiring large tracts of land in areas with high population densities.	PACs, PAPs

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
				- Agricultural support must be provided along with replacement land in order to allow impacted households to quickly become self-sufficient in food provision again. - Skills training must begin as early as possible in the project cycle to prepare as many locals as possible for direct and indirect employment on the project. - Local employment is the highest-priority benefit for local communities and the project should put a fair and effective local employment policy and plan in place. - Local procurement for local businesses builds support for the project.	
After RAP completion (construction and/or operation)	GM report and Monitoring and Evaluation report	Regular community meetings and Grievance mechanism	Feedback from community and reporting on grievances	• Ongoing support • Publicise/broadcast the importance of the project in the long term, how people can benefit from electricity and how and when the grid will be expanded to their communities (if applicable); • Grievances are best redressed through project management, local civil administration, or other channels of mediation acceptable to all parties. Such channels of mediation may involve customary and traditional institutions of dispute resolution. The project management should make every effort to resolve grievances at the community level. Recourse to the legal system should be avoided, except as a last resort.	PACs, PAPs

5 Characteristics of the environmental and social environment

5.1 Project Areas of Influence

This chapter presents the characteristics of the environmental and social baseline in the project area and surrounds, with regards to the physical, biotic and socio-economic aspects, as required by the Angolan EIA legislation (EIA Regulations - Decree no. 51/2004 of 23 July).

The delimitation of areas of project influence allows for a better understanding of the effect of the project, as well as of the environmental and social impact assessment (refer to Section 4.4). The Areas of Influence considered in this ESIA are defined as follows:

- **Direct Area of Influence (DAI)**: the area that will be affected by direct impacts resulting from project activities.
- **Indirect Area of Influence (IAI)**: the area that will be affected by indirect effects of the project implementation and operation.
- **Regional Area of Influence (RAI):** comprising the greater regional area that will be affected in any way by the implementation of this project.

5.1.1 Direct Area of Influence

For biophysical purposes, the project's DAI was defined as the 2 km wide corridor (1 km on either side of the centreline of the proposed line) for the total length of the line, i.e. 331 km, from where the transmission line exits Lubango substation until it reaches the Cunene River which delineates the border with Namibia. This area is also referred to as 'the study area' (Figure 5.1). This study area includes the proposed Cahama substation area, as well as an area of 500 m surrounding it.

This 2 km wide corridor was also considered the DAI for the landscape, heritage and waste management components of the ESIA.

As for the socio-economic analysis, the DAI comprises a 10 km corridor (5 km on each side of the proposed alignment), covering the communities presented in Table 5.1.

Table 5.1: Communities directly affected by the ANNA project

Province	Municipality	Community
Huíla	Lubango	Lubango
		Hoque
	Chibia	Capunda Cavilongo (also Kapunda Kavilongo)
		Quihita (also Kihita)
	Gambos (ex-Chiange)	Chimbemba
Cunene	Cahama	Cahama (also Kahama)
		Otchinjau
	Curoca	Chitado
	Ombadja	Humbe
		Naulila

5.1.2 Indirect Area of Influence

The Indirect Area of Influence (IAI) for the majority of the biophysical aspects comprises a 10 km corridor (5 km on each side of the proposed alignment) and, similar to the approach for the DAI, the landscape, heritage and waste management assessment also considered this corridor primarily. As for the climate change assessment, the IAI considered a 100 km buffer around the corridor (Figure 5.2).

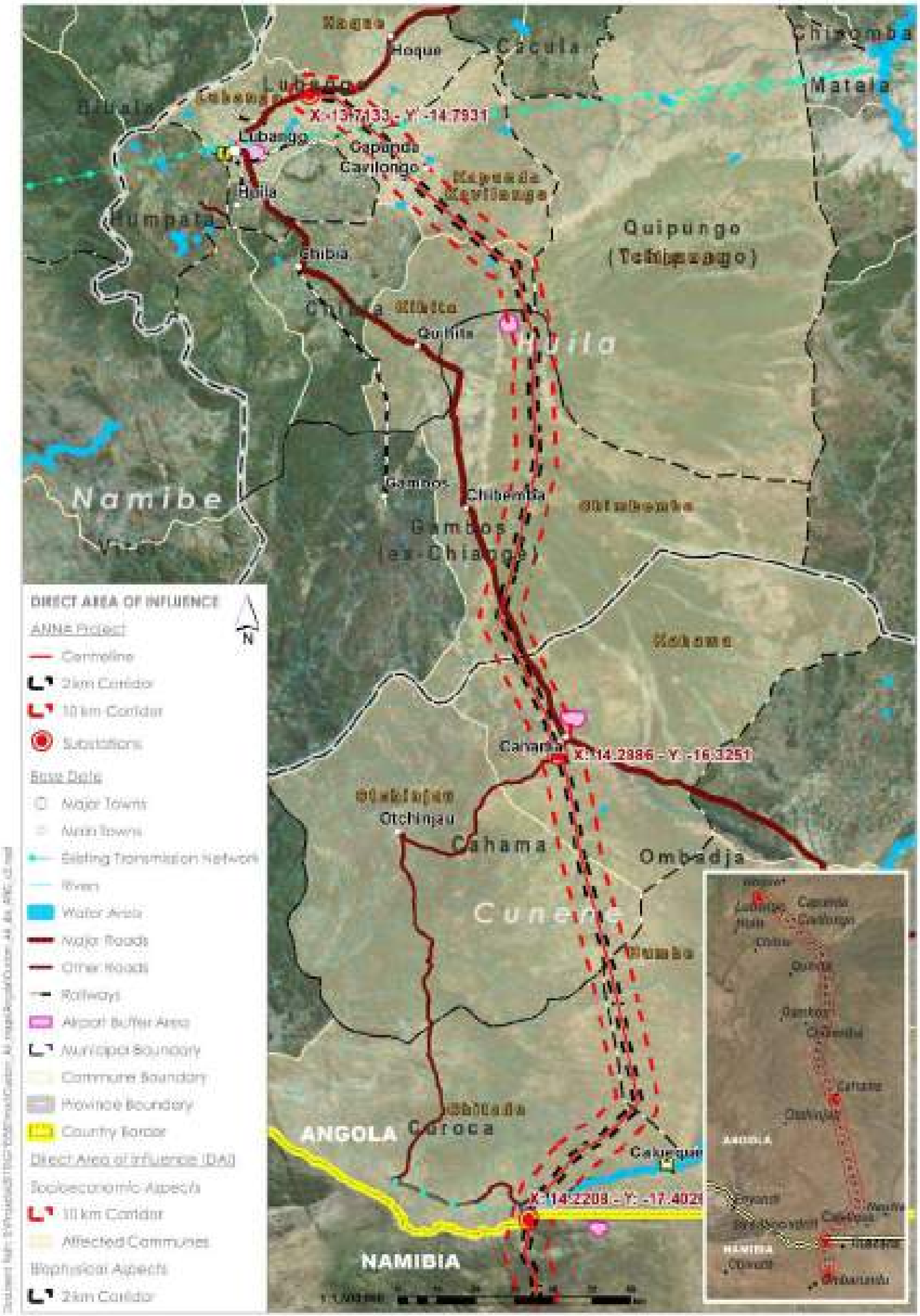


Figure 5.1: ESIA Direct Areas of Influence (DAI)

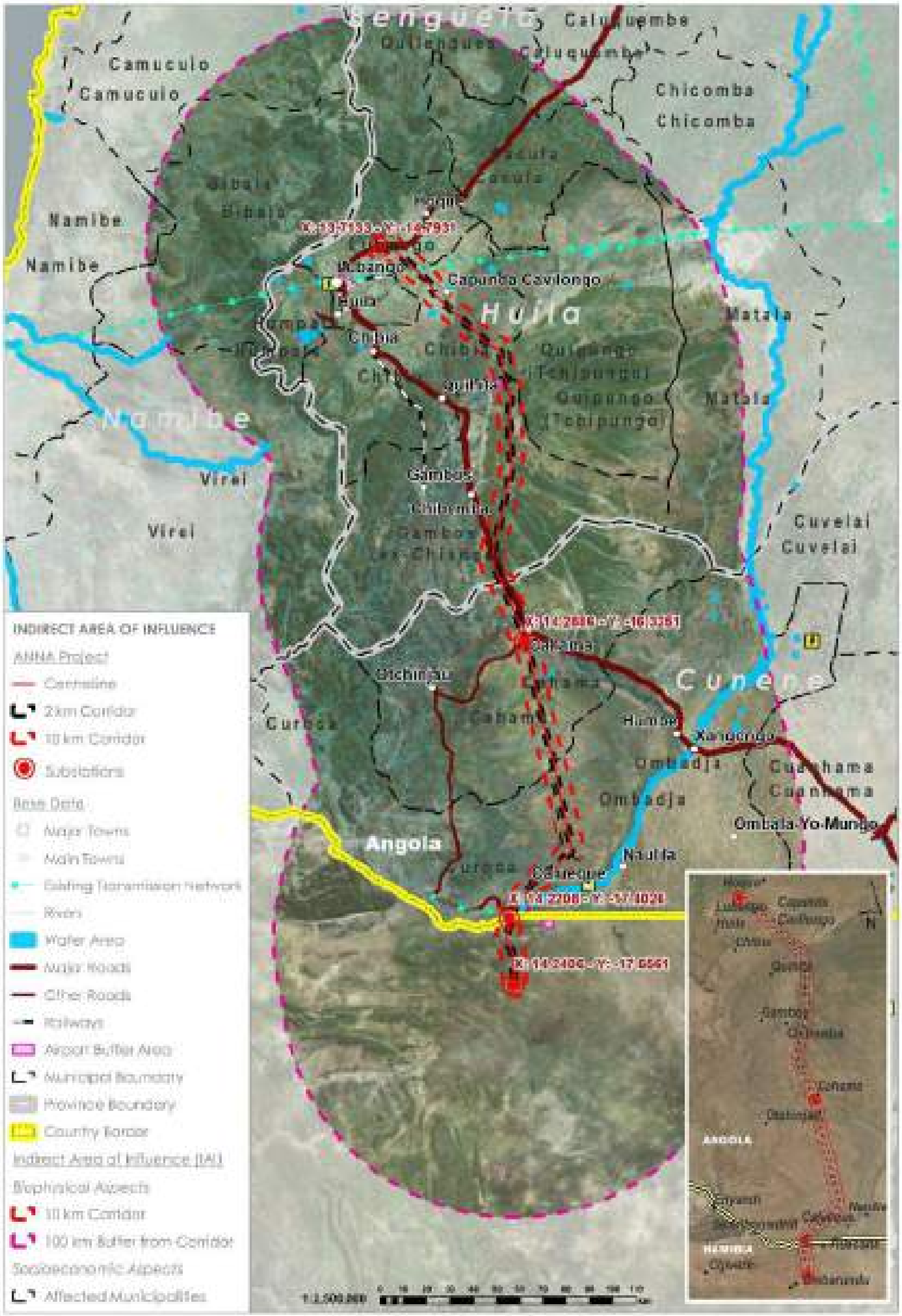


Figure 5.2: ESIA Indirect Area of Influence (IAI)

5.1.3 Regional Area of Influence

An international transmission line is of major economic importance to the socio-economic environment in which it is located. It is important when studying a transboundary transmission line to refer to its area of influence within the region in which it provides its services. As stated in Section 2.3, the main objective of the ANNA project is to expand electricity supply capacity in the SADC region, enhancing the availability and reliability of electricity supply in the respective countries and facilitating electricity trade in the SAPP grid.

In this sequence, the definition of a Regional Area of Influence (RAI) considered the inclusion of the affected provinces in southern Angola, namely Huíla and Cunene, and the Omusati and Kunene regions in northern Namibia, at an initial level of influence. The second layer of influence comprises the national territories of Angola and Namibia as providers and recipients of the energy transmitted by ANNA Project and, finally, at its furthest extent of influence, the Southern African member countries of SAPP as end beneficiaries of the overall grid connection. This assessment is mainly discussed in Section 2.3, but it is referenced in the following sections, particularly were it concerns socio-economic development.

5.2 Physical Environment

5.2.1 Climate change

The Climate Impact Assessment is intended as a resource for relevant decision-makers in need of localised information and insights to assist in assessing risks and in developing effective resilience strategies for energy systems that are vulnerable to climate impacts, with specific reference to the ANNA Transmission Project. The assessment aims to provide decision-makers with a base of high-level information that they can use to further explore what the projected changes in climate might mean for their specific energy assets and to evaluate a range of strategies for effectively increasing asset and system resilience to climate change. In addition, it screens for, and reports on, greenhouse gas emissions, and proposes potential mitigation measures.

The study includes the modelling of current and future climate scenarios which are required to provide an indication of the future receiving environment to identify any adaptation risks and measures. Secondly, it models the effect of the construction and operation of the proposed transmission line on the emission of GHG that would contribute to climate change.

5.2.1.1 Applicable regulations and legislation

5.2.1.1.1 International regulations and guidelines

As mentioned before in Section 3.3, the implementation of the ANNA project must respond to the requirements of international financial institutions namely the IFC and the DBSA. A summary of the requirements applicable to this project in terms of climate change, is described below.

The IFC recognises that climate change is a serious global challenge and that climate-related impacts may impede economic and social well-being and development efforts. Accordingly, addressing climate change is a strategic priority for the IFC and considered to be a cross-cutting topic across the IFC's Performance Standards (IFC, 2012). It is also explicitly mentioned in PS 1: Assessment and Management of Environmental and Social Risks and Impacts, PS 3: Resource Efficiency and Pollution Prevention and PS 4: Community Health, Safety, and Security.

Similarly, DBSA's Environmental and Social Safeguard Standards (ESSS) consider climate change as a cross-cutting issue. ESSS 1: Project screening: environmental and social risks, impacts and opportunities, applies to all projects seeking DBSA financing and support, and requires the project to screen for, and report on, GHG emissions, climate change impacts and climate change mitigation and adaptation measures. ESSS9: Biodiversity conservation and sustainable living natural resources management, emphasises the support of a preventative approach to conserve, manage, and utilise biodiversity resources in a sustainable manner. ESSS7: Community health and safety, has, as main objectives: to anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project life-cycle by promoting quality and safety in infrastructure design and construction, avoiding/minimising community exposure to risks and hazards, putting effective emergency management measures in place and ensuring the safety of personnel and property. Potential project-level risks and impacts on ecosystems, which are vital to the well-being of communities and which can be aggravated by climate change, need to be identified, and mitigation actions are to be put in place to limit any potentially unfavourable impacts.

5.2.1.1.2 Angolan policies and legislation on climate change

The policy context for guiding efforts to reducing the effects of climate change in Angola, are embedded within a higher-level global agenda on climate change (adaption, mitigation and resilience, etc.). In response to the Paris Agreement (to reduce GHG emissions) and the Agenda 2030 Sustainable Development Goals, the strategy sets out the vision for Angolan national policy by 2030, taking into account the need to articulate Angolan policy in terms of mitigation and adaptation to reduce the impacts of climate change. As identified in the National Adaptation Programme of Action (NAPA), agriculture and food security, forests and biodiversity, fisheries, water resources, human health, infrastructure, coastal zones and energy, were acknowledged as the leading sectors affected by climate change. As such, the National Climate Change Strategy 2018-2030 arises from the need to articulate objectives, instruments and institutions to pursue the latest challenges facing the country, both in terms of its economy and improving conditions. ENAC will lead to the development of the National Emissions Plan (PNE) and the National Climate Change Adaptation Plan (PNAAC).

This section describes the policy and legislative context of Angola' s climate change initiatives and, in some cases, as it relates to the energy sector. The key policies are outlined below (Table 5.2).

Table 5.2: Legislative context

Legal Requirements		
Legislation considered	**Relevant organ of state / authority**	**Aspect of project**
Sendai Framework for Disaster Risk Reduction (SFDRR)	Government of the Republic of Angola	The SFDRR is the first global policy framework of the United Nations' post-2015 agenda. It represents a step in the direction of global policy coherence, with explicit reference to health, development and climate change. To develop SFDRR, the United Nations Office for Disaster Risk Reduction (UNISDR) organised and facilitated several global, regional, national, and intergovernmental negotiations and technical meetings in the period preceding the World Conference on Disaster Risk Reduction (WCDRR) 2015 at which SFDRR was adopted. The SFDRR was born from the need to ensure that DRR policy reflects our evolved understanding of the complexity of disaster risk in the 21st century. Implementation calls for closer collaboration among all sectors, including the health sector, in order to prevent, prepare for, respond to, and recover from disasters that result from the highly interdependent and evolving risks to which we are exposed.
Initial National Communication to the United Nations Framework Convention on Climate Change (UNFCCC)	Government of the Republic of Angola	The government of Namibia is a signatory to the UNFCCC and has developed Initial and Secondary National Communications in fulfilment of its obligations under Articles 4 and 12. The UNFCCC is an international environmental treaty aimed at stabilising GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Although the framework sets non-binding limits on GHG emissions for individual countries and contains no strict enforcement mechanisms, it outlines how specific international treaties may be negotiated to specify further action towards the objective of the UNFCCC.

Legal Requirements		
Legislation considered	**Relevant organ of state / authority**	**Aspect of project**
Paris Agreement	Government of the Republic of Angola	The Paris Agreement was adopted on 12 December 2015 and is a treaty under international law, but only certain provisions are legally binding. The Agreement is a comprehensive framework for addressing climate change on an international level and is regarded as a significant landmark in the development of the international climate change regime under the UNFCCC. However, a significant portion of the operational details of the new framework are only to be established in future Conferences of the Parties (COPs). Of particular importance are Intended Nationally Determined Contributions (INDCs), which refer to the post-2020 climate actions that individual countries intend to take under the new international agreement. INDCs pair national policy setting, in which countries determine their contributions in the context of their national priorities, circumstances and capabilities, with a global framework under the Paris Agreement that drives collective action toward a zero-carbon, climate-resilient future.
Sustainable Development Goals (SDGs)	Government of the Republic of Angola	The SDGs build on the successes of the Millennium Development Goals while including new areas such as climate change. The SDGs came into effect in January 2016, and they will continue to guide United National Development Programme (UNDP) policy and funding until 2030.
Angola's National Plan of 2010-2011	Government of the Republic of Angola	The National Plan for 2010-2011, approved by Law 1/10 of 15 January, has the following objectives, among others: implementing a rural and suburban development policy that mitigates the inequality between rural and urban areas of quality of life, refurbishing and developing the infrastructure needed to reconstruct and develop the country, promoting accelerated industrial development aimed at replacing imports, ensuring rapid urbanisation of shanty towns and modernising urban communities, and pursuing the process of implementing the National Programme for Climate Change. The climate change component of the National Plan further provides for adaptation and mitigation measures in the areas of agriculture, fishing, water resources, biodiversity, construction, energy and waste management.
National Development Plan 2013-2017 (2012)	Government of the Republic of Angola	The National Development Plan (2013-2017) of Angola is a strategic document that provides a long-term perspective on improving the quality of life of Angolan families, reducing inequalities and poverty, promoting distribution and geographical decentralisation and boosting territorial competitiveness, stimulating active citizenship, entrepreneurship and innovation and job creation. Amongst other focus areas and objectives, the plan also provides directives for a policy on electricity.
National Adaptation Programme of Action (NAPA)	Government of the Republic of Angola	The development of the National Adaptation Programme of Action (NAPA) was in accordance with the guideline set out in the UNFCCC and is an instrument geared toward communicating the urgent and immediate adaptation challenges faced in Angola. The drafting of NAPA was undertaken by the Angolan Government with support from the United Nations Environment Programme (UNEP) and the Global Environment Fund (GEF). NAPA provides an analysis of the various sectors vulnerable to climate change, as well as the challenges faced in each of these sectors. Several projects, or adaptation priorities, were identified by NAPA, which are intended to address the urgent adaptation needs of the country. Projects specifically related to the energy sector include, amongst others, promoting renewable energy, extending the electricity grid to rural areas, revising sectoral laws for proactive adaption, climate monitoring and data management systems, improving knowledge of hydrology, climate change impact studies on hydro-electricity, etc.
Intended Nationally Determined Contribution (INDC) (2015)	Government of the Republic of Angola	The contributions of Angola to the Intended Nationally Determined Contribution (INDC) are included in the framework of the National Strategy for the Implementation of UNFCCC and the Kyoto Protocol, the Strategy to Fight Poverty (SFP), the National Adaptation Programme of Action (NAPA) and the Long-Term Strategy for Development of Angola (2025). Angola is committed to participate in the aspirations set at an

Legal Requirements		
Legislation considered	**Relevant organ of state / authority**	**Aspect of project**
		international level to fight against the phenomenon of climate change, thus contributing to global efforts to reduce greenhouse gas (GHG) emissions. Angola's INDC has committed to implementing mitigation measures (both unconditional and conditional) to reduce GHG emissions. The country is committed to stabilising its emissions and to contribute to climate change mitigation by 2030, targeting the following sectors: • power generation from renewable sources, and • reforestation. As such, Angola plans to reduce GHG emissions by up to 35% unconditionally by 2030, as compared to the Business as Usual (BAU) scenario (base year 2005). In addition, it is expected that through a conditional mitigation scenario, the country could reduce an additional 15% below BAU emission levels by 2030. In achieving its unconditional and conditional targets, Angola expects to reduce its emissions trajectory by nearly 50% below the BAU scenario by 2030 at an overall cost of over USD14.7 billion. Given its extreme vulnerability to climate change impacts in some key economic sectors, Angola's INDC also includes priority adaptation actions that will enable the strengthening of the resilience of the country towards the attainment of the Long-Term Strategy for Development of Angola (2025).
The National Climate Change Strategy (ENAC) 2018-2030	Government of the Republic of Angola	In response to the Paris Agreement (to reduce GHG emissions) and the Agenda 2030 Sustainable Development Goals, this strategy sets out the vision for Angolan national policy by 2030 and takes into account the need to articulate Angolan policy in terms of mitigation and adaptation to reduce the impacts of climate change. As identified in NAPA, agriculture and food security, forests and biodiversity, fisheries, water resources, human health, infrastructure, coastal zones and energy, were acknowledged as the leading sectors affected by climate change. As such, the National Climate Change Strategy 2018-2030 arises from the need to articulate objectives, instruments and institutions to pursue the latest challenges facing the country, both in terms of its economy and the improvement of conditions. ENAC will lead to the development of the National Emissions Plan (PNE) and the National Climate Change Adaptation Plan (PNAAC).

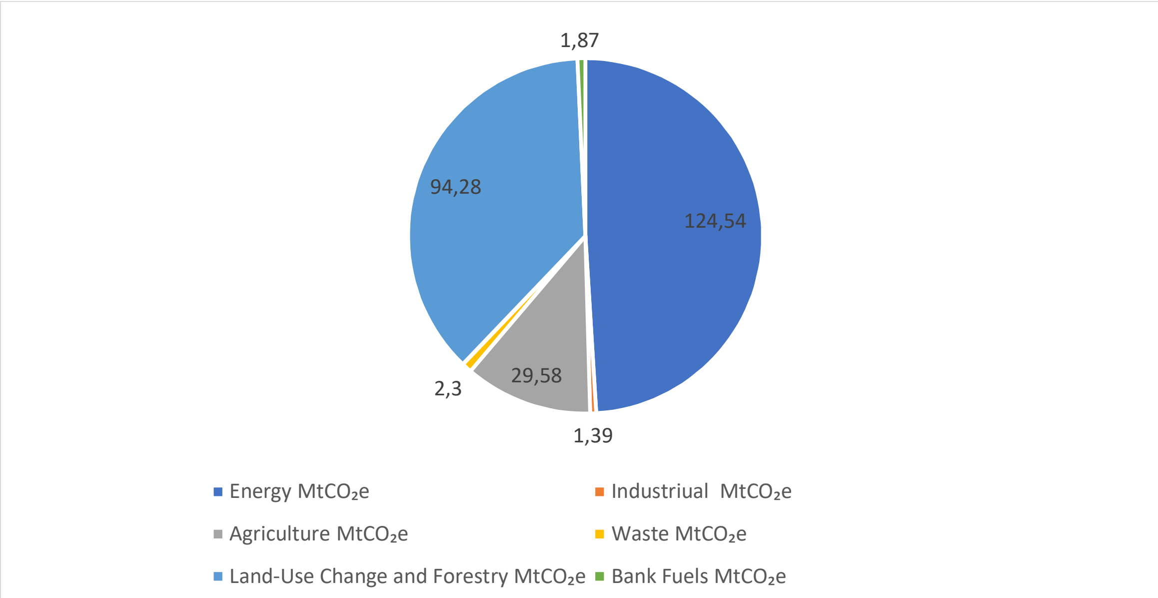
In terms of the GHG emissions landscape, Angola's long-term strategy for the energy sector (Ministry of Energy and Water, 2015) outlines strategic objectives for the country in acknowledgment of the development challenges facing the energy sector. The Policy Strategy for National Energy Security centres around the growth of generation capacity and grid expansion.

According to national projections, energy demand is expected to increase significantly up to 2025 which is estimated to attain a projected load of 7.2 GigaWatt. This growth will be driven by the ambitious electrification targets and subsequent increased residential and services sector, as well as industrial consumption.

Angola has identified the need to integrate future demand and the large hydro and gas projects, with an adequate transmission network with interconnection, that will enable Angola's participation in the regional market and which, with the recently approved National Strategy for New Renewable Energies, will respond to the guidelines and goals of the Strategy for Energy Security. Priority will be given to grid extension to maximise the number of municipal and community townships connected to the grid, as well as to continued investment in structural projects in the interconnected grid. The ANNA Transmission Line Project will make a direct contribution to addressing these needs.

Angola's current strategy considers the key national power generation options as consisting of hydro, thermal and new renewables. The generation mix selected for the 2025 horizon results from a weighting of criteria, namely economic, regional development, environmental and energy security. The 2025 vision opted to balance hydro and natural gas and to prioritise hydro-power plants and locations that optimise the balance between economy and regional development.

The National Transmission Network (RNT) will continue to expand, with the goals of interlinking all provincial capitals, of taking the power grid to an ever-increasing number of municipal and community townships, of maximizing generation efficiency, and of promoting Angola's interconnection to the regional system of SADC. The North-Central-South transport corridor will provide provinces with competitive energy and enhanced supply security, connect the Angolan power system to the Democratic Republic of Congo (in the north) and Namibia (in the south) and, after 2025, allow the transport of gas-based generation from newly discovered gas locations (Figure 5.3).



Source: WRI, 2019

Figure 5.3: Angola's national GHG emissions per sector

5.2.1.2 Methodology

5.2.1.2.1 Geographical/spatial and temporal scope

The climate analysis considered a 100km buffer around the project site as the IAI, and as DAI the 10 km corridor, as explained in Section 5.1. This assessment considers the project construction, operation and decommissioning phases.

The geographic and spatial scope of the GHG assessment centres on the 1 km-wide corridor of the proposed alignment, as a directly influenced area, as well as the 5 km-wide corridor, as a secondary influenced area. Any site within the 5 km-wide corridor could be affected by the proposed development and, where known, are included in this report. Mitigation measures and secondary investigations have adopted the boundaries of this corridor as the spatial parameters of the study area. The alignment route and pylon placement sites will form part of the proposed evaluation of impacts anticipated for the development.

5.2.1.2.2 Limitations

Presenting climate data is often a complex task, particularly when assessing multiple variables with different measured units and anomalies, time scales and Representative Concentration Pathways (RCP) scenarios. Analysis should seek to present the data in a way that is fully indicative while remaining understandable and useful to decision-makers. This is done by assessing changes in the variables of maximum temperature, precipitation variability and precipitation intensity, individually. Each variable has particular characteristics that must be assessed.

Using climate projection data requires the acknowledgement of various uncertainties. The IPCC projections rely on 40 different Global Climate Models (GCMs) with different accuracies forecasting the varying RCP scenarios. These RCPs are themselves estimates of potential future thermal forcings, as informed by adherence to emission policies and potential future technologies. The downscaling of the IPCC data required robust constraining parameters to present a more accurate local projection. In areas where observational data is limited, these constraining parameters have increased uncertainty. Results obtained, and recommendations made, based on this data should be used as a guideline to adapt/mitigate to a potential future climate, rather than a definitive one. This is particularly prevalent when noting the significant disparity in the current variability of rainfall regimes. This is influenced by factors such as topography, wind, vegetation and even ocean currents. Beyond that, a further layer of complexity is added when looking at rainfall intensity, diurnal and seasonal onsets, before accounting for short and long-term influences such as the diurnal, seasonal, inter-annual cycles, the El Niño/Southern Oscillation ENSO cycles, as well as decadal changes. When projecting precipitation changes into a semi-unknown future, these uncertainties are further exacerbated.

The projection parameters are therefore presented in terms of a probability of changes, highlighting the most-likely range of precipitation experienced in the future. The probabilities also allow for the possibility of more extreme anomalous occurrence of events in both directions, i.e. the probability of more extreme rainfall days, as well as less extreme rainfall days.

As for the GHG emissions, due to the default emissions factors and estimated tonnages being used, the carbon footprints presented may be 25% above or below their true value, given the range of value associated with certain materials. The calculations do however provide a good indication of the relative magnitude of the GHG emissions contributed by each activity or material based on the activity data that was available.

5.2.1.2.3 Climate analysis

The scale of future climate impacts will vary based on the anthropogenic mitigation of factors responsible for changes currently experienced. The mitigation scenarios account for several variances of potential global economic and environmental development and are quantified as the Representative Concentration Pathways (RCP). The four RCP scenarios depicted in Table 5.3 are estimated concentrations of CO_2, Methane (CH_4) and Nitrous oxide (N_2O) based on a combination of assessment models, namely MESSAGE (Riahi, Gruebler, & Nakicenovic, 2007), AIM (Hijioka, Matsuoka, Nishimoto, Masui, & Kainuma, 2008), GCAM (Wise, et al., 2009), IMAGE (van Vuuren, et al., 2007), the global carbon cycle and atmospheric chemistry and climate models. They also integrate assumed land use changes and sector-based emissions of greenhouse gases from present day levels. These present GHGs include the sectoral assessment of energy supply, industry, transport, and buildings with contributions of 47%, 30%, 11% and 3% respectively (IPCC, 2014).

Table 5.3: Representative Concentration Pathways

	CO_2 (ppm)	CH_4 and N_2O (ppm)	Resulting radiative forcing ($W.m^{-2}$)	Scenario
RCP 2.6	421	54	2.6	Best case
RCP 4.5	538	92	4.5	Best case - Medium scenario
RCP 6.0	670	130	6.0	Worst case - Medium scenario
RCP 8.5	936	377	8.5	Worst case

These RCPs were used as input into the coupled model ensembles of the IPCC Assessment Report Five (AR^5) (IPCC, 2014). These RCPs show the change from pre-industrial insolation Watts per m² resulting from the emissions.

RCP 2.6 represents the mitigation scenario leading to a very low forcing level – **best case** – that is, emissions stabilise from 2010 to 2020, and decrease thereafter (best case scenario with global focus on environmentally-sustainable practices). RCP 4.5 – **likely best case** – emissions stabilise by 2040 and decrease thereafter. RCP 6.0 – **likely worst case** – emissions stabilise by 2080 and decrease thereafter.

RCP 8.5 represents the very high GHG emission scenario – emissions do not stabilise - **worst case** scenario with a focus on economic advancement at the expense of environmental sustainability. These emission scenarios shed light on the varying potential climatic futures based on human development goals in the present, and near, future.

CORDEX data used for temporal analysis

The RCP climate analysis dataset that was used, is Swedish Meteorological and Hydrological Institute – SMHI CORDEX CMIP5 historical and CMIP5 IPCC AR5 projected experiments at 0.5° x 0.5° spatial resolution, and daily temporal resolution from 1951 to 2005 and from 2006 to 2100.

Downscaled data has several advantages over the large-scale General Circulation Models (GCMs), the most useful being the increased spatial and temporal resolution. Having higher-resolution spatial data provides greater local context between areas of interest, while daily temporal scales allow for analysis such as extreme events or accumulation anomalies that is not possible with monthly data. The CORDEX experiments seeks to downscale the GCMs utilised in the IPCC AR5 analysis. To better understand the computational requirements for this task, regions were allocated to different climate analysis institutes and models known to better simulate conditions in those regions. The Africa region was assigned to the Swedish Meteorological Hydrological Institute (SMHI). They use the following models for downscaling the GCM data for CORDEX analysis (Table 5.4).

Table 5.4: CORDEX data (Christensen, Gutowski, & Nikulin, 2012) used for temporal analysis

Historical	Projected RCP4.5	Projected RCP8.5
CCCma-CanESM2	CCCma-CanESM2	CCCma-CanESM2
CNRM-CERFACS-CNRM-CM5	CNRM-CERFACS-CNRM-CM5	CNRM-CERFACS-CNRM-CM5
CSIRO-QCCCE-CSIRO-Mk3-6-0	ICHEC-EC-EARTH	ICHEC-EC-EARTH
ICHEC-EC-EARTH	IPSL-IPSL-CM5A-MR	IPSL-IPSL-CM5A-MR
IPSL-IPSL-CM5A-MR	MIROC-MIROC5	MIROC-MIROC5
MIROC-MIROC5	MOHC-HadGEM2-ES	MOHC-HadGEM2-ES
MOHC-HadGEM2-ES	MPI-M-MPI-ESM-LR	MPI-M-MPI-ESM-LR
MPI-M-MPI-ESM-LR	NCC-NorESM1-M	NCC-NorESM1-M
NCC-NorESM1-M	NOAA-GFDL-GFDL-ESM2M	NOAA-GFDL-GFDL-ESM2M
NOAA-GFDL-GFDL-ESM2M		

WorldClim data used for spatial analysis

WorldClim (Hijmans, Cameron, Parra, Jones, & Jarvis, 2005) data is a set of bias-corrected high-resolution downscaled climate models that can be used for detailed spatial analysis of an area's climate changes. This data is presented at a lower temporal resolution than the CORDEX data but is resolved to 1 km x 1 km, making it a good spatial complement. Variables presented are minimum, maximum and average temperature, precipitation (mm), and bioclimatic variables, and follow the IPCC AR5 outputs for RCP 4.5 for the near and far futures. The following models are used for the spatial analysis from historical, and RCP4.5, scenarios (Table 5.5).

Table 5.5: WorldClim data used for spatial analysis

Historical	RCP 4.5
ACCESS1-0	GISS-E2-R
BCC-CSM1-1	HadGEM2-AO
CCSM4	HadGEM2-CC
CESM1-CAM5-1-FV2	HadGEM2-ES
CNRM-CM5	INMCM4

Historical	RCP 4.5
GFDL-CM3	IPSL-CM5A-LR
GFDL-ESM2G	MIROC-ESM-CHEM

5.2.1.3 Current climate

Angola’s climate is entirely inconsistent due to the country’s diverse altitude and topography, but even more so by the effect of the Benguela Current. Angola is classified as an arid, semi-arid, savannah, and temperate environment according to the generalised Köppen climate classification (Peel, Finlayson, & McMahon, 2007). The portion of the project that is located within Angola in an area classified as having a semi-arid (BSh) climate (Figure 5.4).

Normally, Angola’s climate is distinguished by two well-defined seasons: i) the cool and dry “Cacimbo” season from June to September and ii) the warm “rainy” season from October to May. The coastal region is comparatively humid, with a mean annual rainfall of 600 mm, declining from the north to the south. The coast experiences rainfall to a lesser degree of than the inland areas, as the cooling result of the northward-flowing Benguela Current becomes more noticeable. Inland, the northern areas receive between 1 150 mm and 1 660 mm of rainfall annually. The northern coast experiences between 340 mm and 840 mm of rainfall annually, with the south-west zone, close to the Kalahari Desert, semi-arid and receives between 5 mm and 360 mm of rainfall annually.

Coastal temperatures are mitigated by the heat-retentive capacity of the ocean. The ocean retains heat from daytime insolation and serves to keep the night-time temperatures along the coastline milder. The opposite occurs during the day, as the water takes a longer time to heat up and therefore reduces the near-coast temperatures. In areas further inland and away from large water bodies, this mitigation influence does not occur. There is therefore a greater diurnal temperature range, being warmer during the day and cooler at night. The minimum and maximum temperatures in the area of the project site is approximately 14-16℃ and 30-32℃, respectively. However, minimum and maximum temperatures vary across the study region. Minimum temperatures of up to 20℃ can be experienced along the coast, with maximum temperatures of approximately 22-24℃.

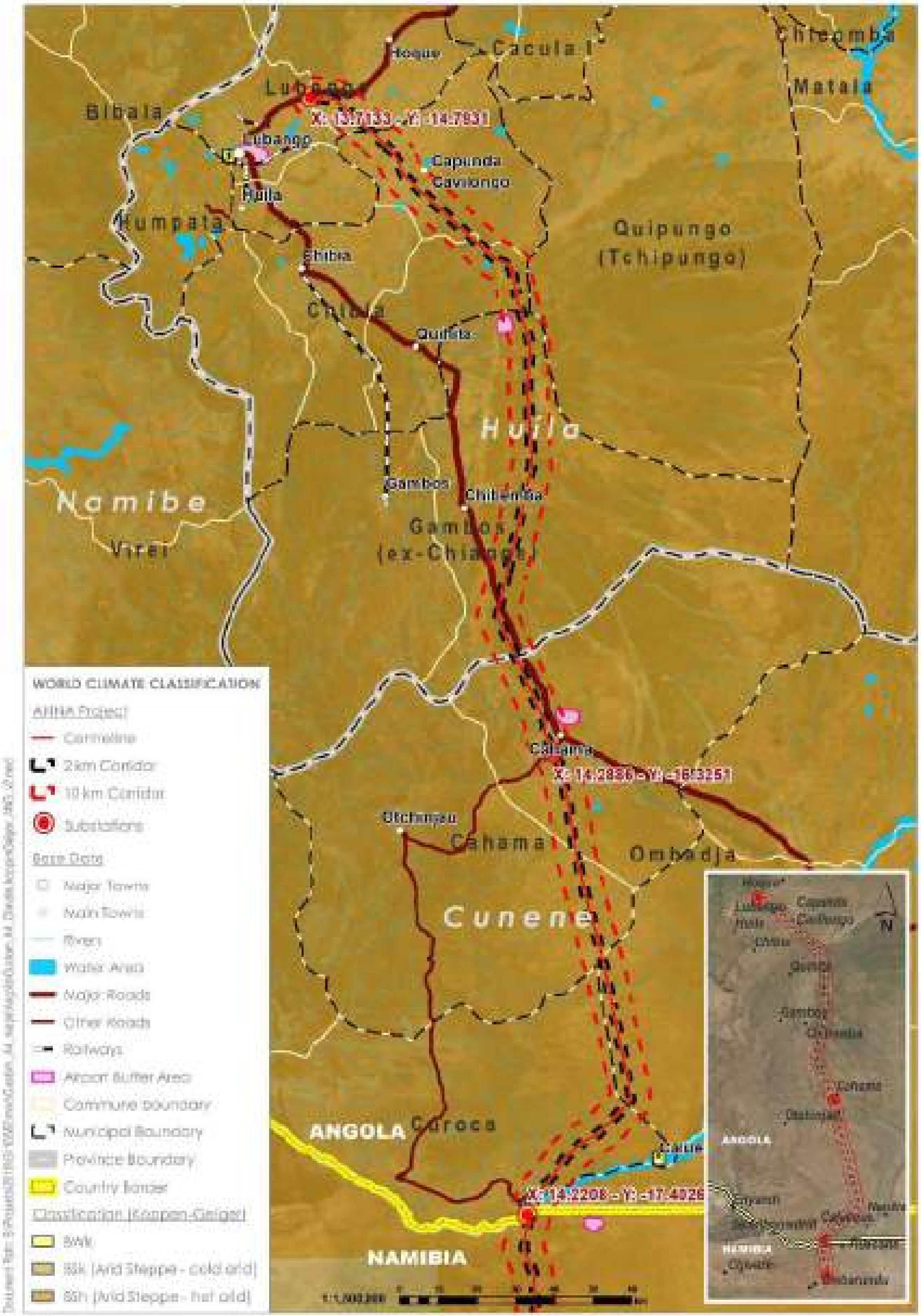


Figure 5.4 Köppen climate classification – Angola

5.2.1.4 Baseline and future climate (spatial analysis)

Figure 5.6 spatially presents the baseline and future climate for the project as a whole (Namibia and Angola). Annual precipitation shows the locations of the precipitation maximums. As shown in Figure 5.6 Map A, in the 1985 – 2005 timeframe, annual precipitation occurring in the 100 km buffer of the project site ranges from below 345 mm, to approximately 1200 mm, and has an increasing gradient from south to north. By 2060, annual precipitation (Figure 5.6 Map C) is expected to increase by approximately 18 to 28 mm under the RCP4.5 scenario, with an increasing gradient from north-west to south-east. The 10 km corridor is expected to mostly experience a 22 to 24 mm increase in annual precipitation.

With regards to temperature, the maximum temperature of the warmest month figure indicates the locations of the extreme temperature months. As shown in Figure 5.6B, in the 1985 – 2005 timeframe, maximum temperature occurring in the 100 km buffer of the project site ranges from approximately 26℃ to 37℃. The 10 km corridor mostly experiences temperatures ranging from 28℃ to 34℃. As shown in Figure 5.6 Map D, by 2060, maximum temperature is expected to increase by approximately 1.5℃ to 3.1℃ under the RCP4.5 scenario, with an increasing gradient from north-west to south-east. The 10 km corridor is expected to mostly experience a 2℃ increase in maximum temperature.

5.2.1.5 Future climate (temporal analysis)

5.2.1.5.1 Maximum temperature

5.2.1.5.1.1 Annual

The trend in annual maximum temperature across decades is strongest between 2020 and 2050 (Figure 5.5). RCP4.5 tapers at this point, but RCP8.5 continues to increase towards the latter part of the century.

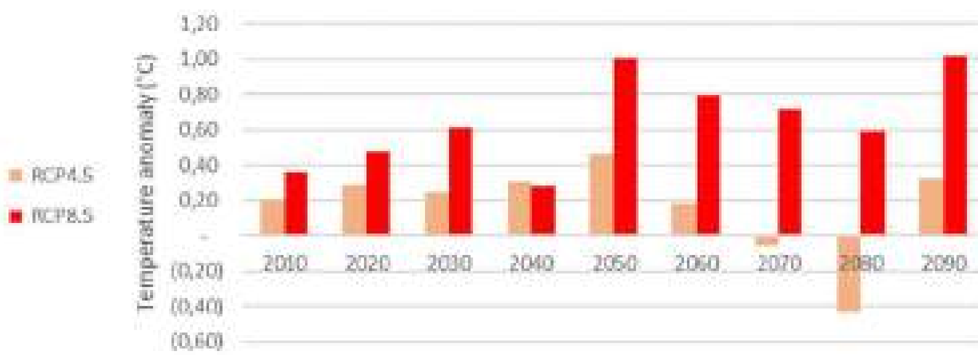


Figure 5.5: Decade trend anomaly

Figure 5.7 shows a strong increase in the average maximum temperature. RCP4.5 tapers around 2050, while RCP8.5 increases throughout to approximately 34℃ in 2095 from 29℃ in 1985. The trend is approximately 0.025℃ per decade, with a 95% confidence at 0.16℃.

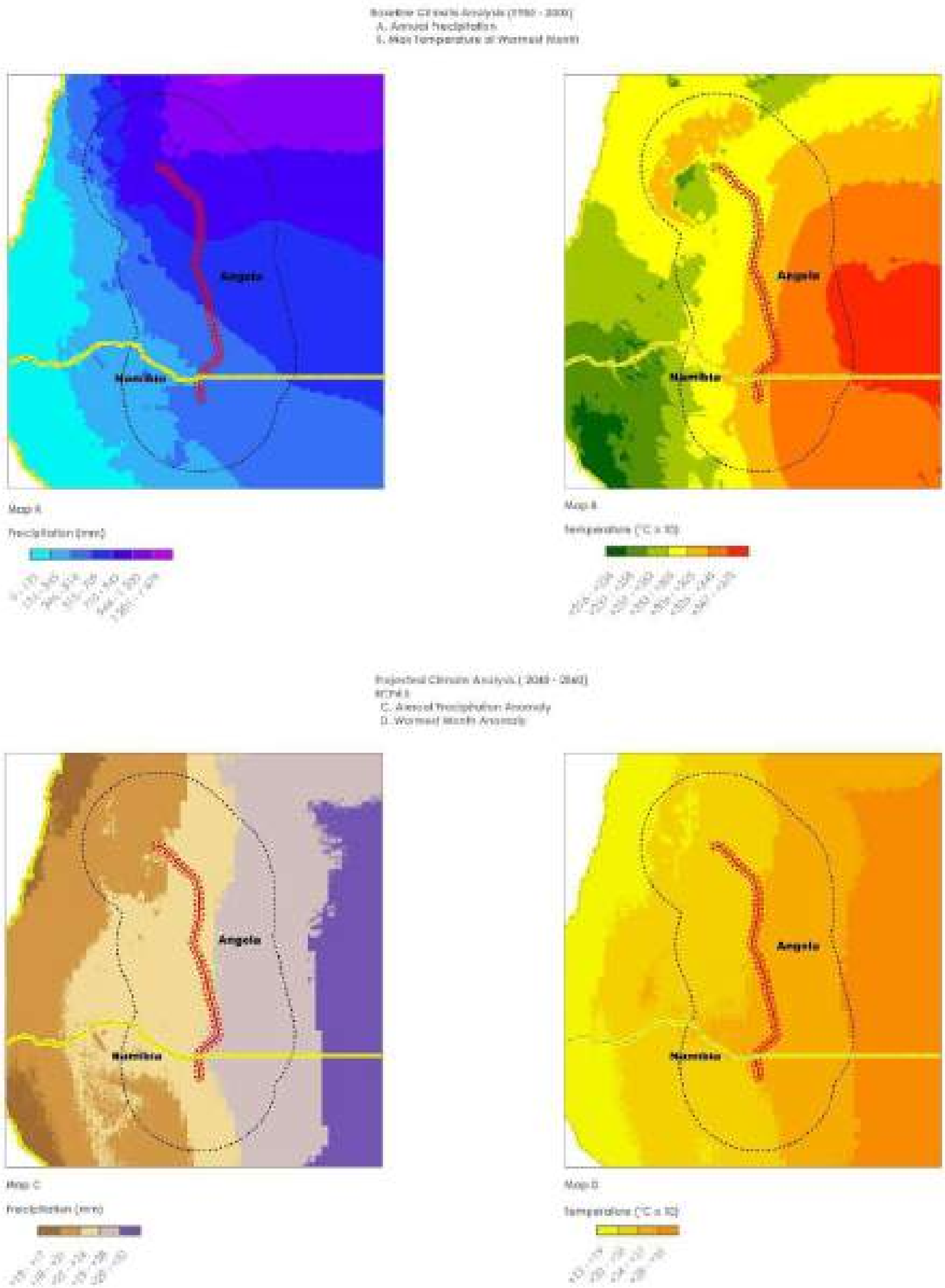


Figure 5.6: Spatial analysis of baseline and future climate

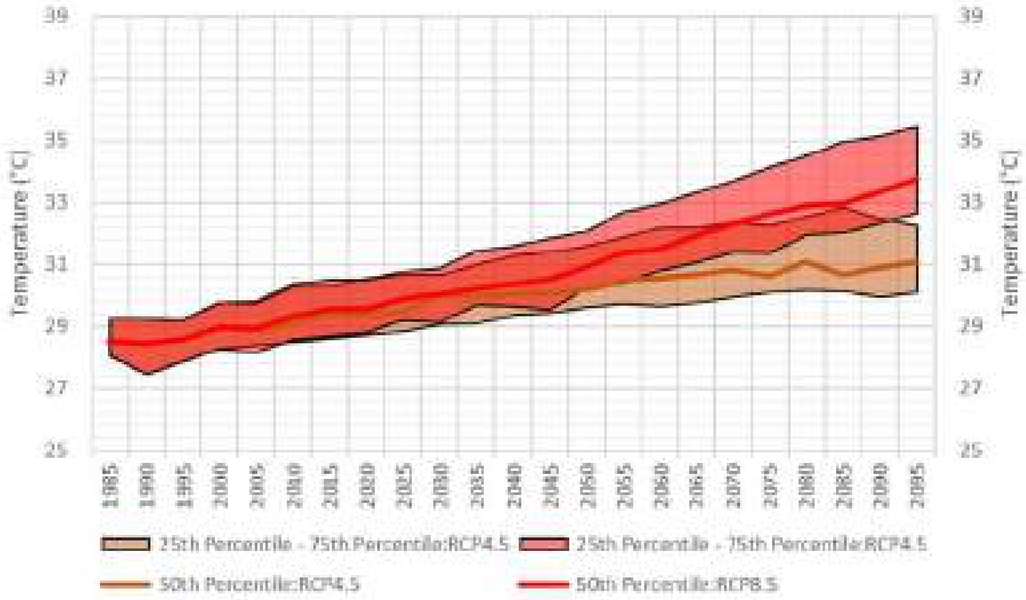


Figure 5.7 Projected average maximum temperature

5.2.1.5.1.2 Monthly

Figure 5.8 shows increases of approximately 1 - 3℃ every month for the decades going forward, most notably in October. RCP8.5 is significantly higher, with increases reaching up to 6℃.

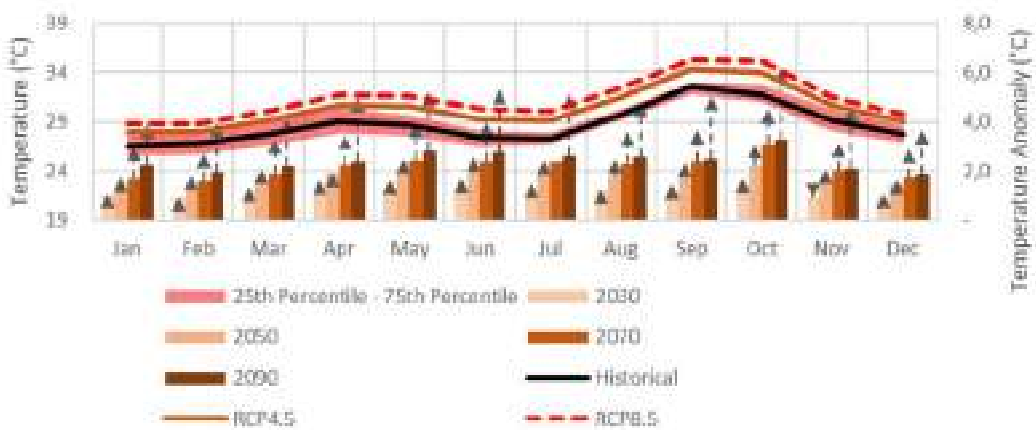


Figure 5.8 Projected monthly maximum temperature

5.2.1.5.1.3 Profile

The monthly temperature profile shows the range of likely temperatures in any given month. All scenarios in Figure 5.9 show that these peak in September/October. Historically, the peak is at approximately 36℃ (Figure 5.9A). Projected RCP4.5 shows that the peak temperature is approximately 39℃ (Figure 5.9B) while RCP8.5 is above 42℃ (Figure 5.9C).

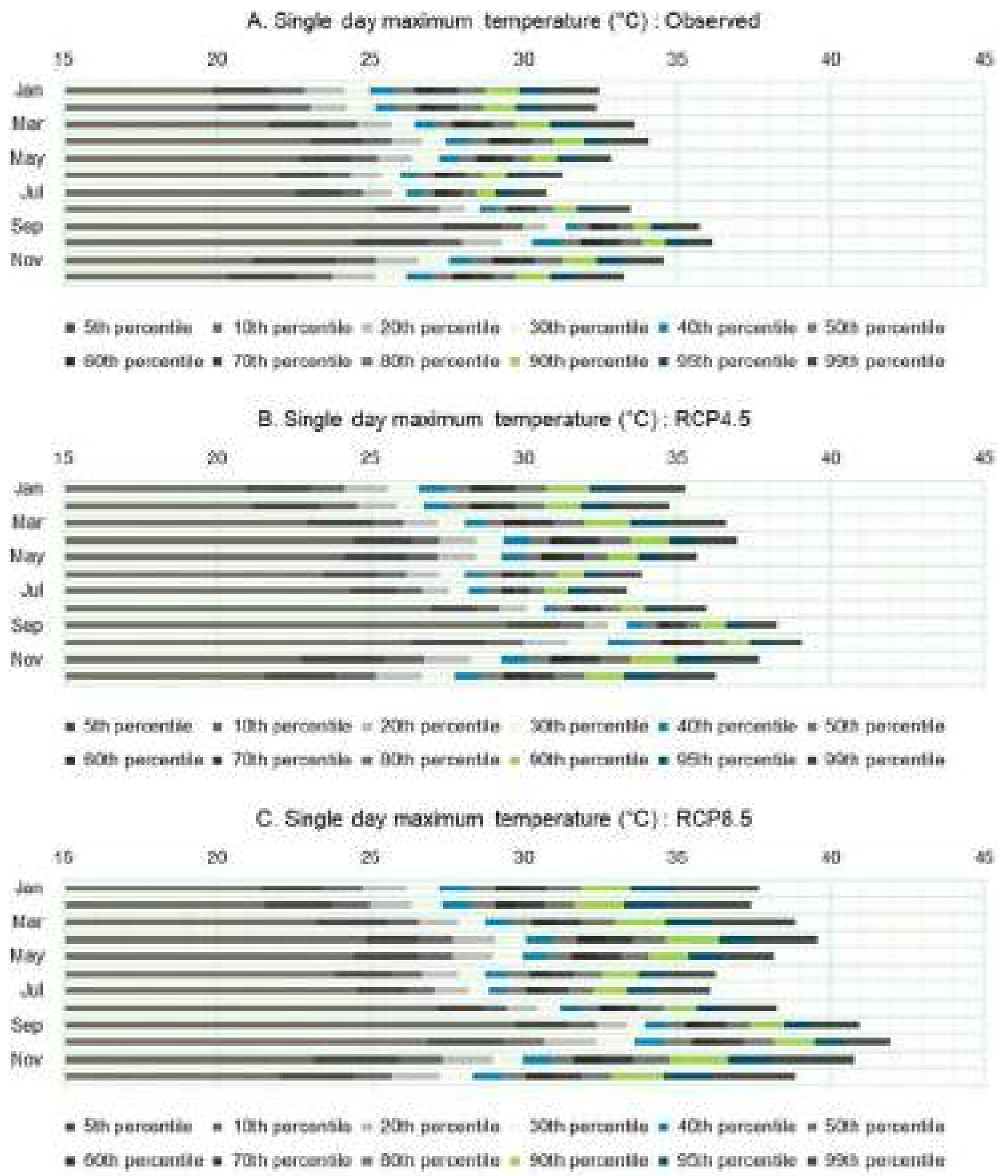


Figure 5.9 Single day maximum temperature

5.2.1.5.1.4 Extreme temperature days

The increase in the extreme temperature range is much higher in RCP8.5 (Figure 5.11), up to 6℃, and approximately 3℃ in RCP4.5 by 2100 (Figure 5.10). The 90th, 95th and 99th percentile changes are all increased and indicative of the changes in the full maximum temperature profile.

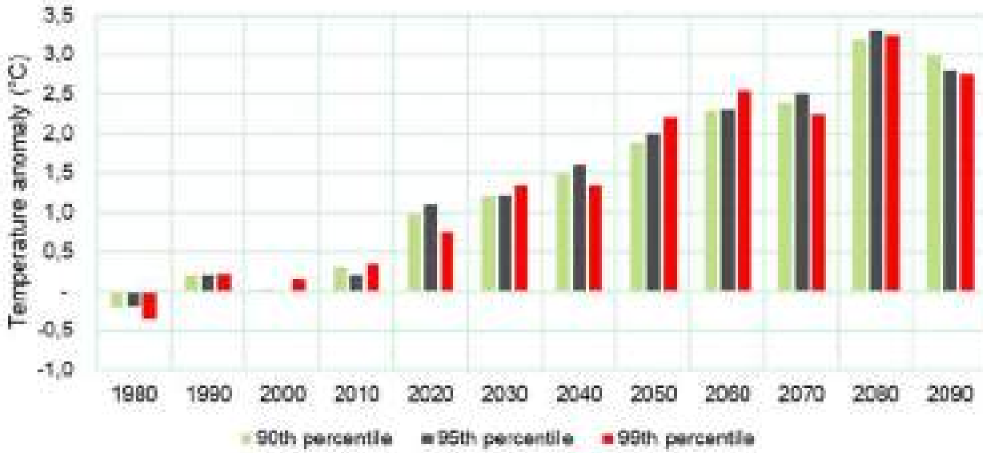


Figure 5.10 Change in extreme temperatures days: RCP4.5

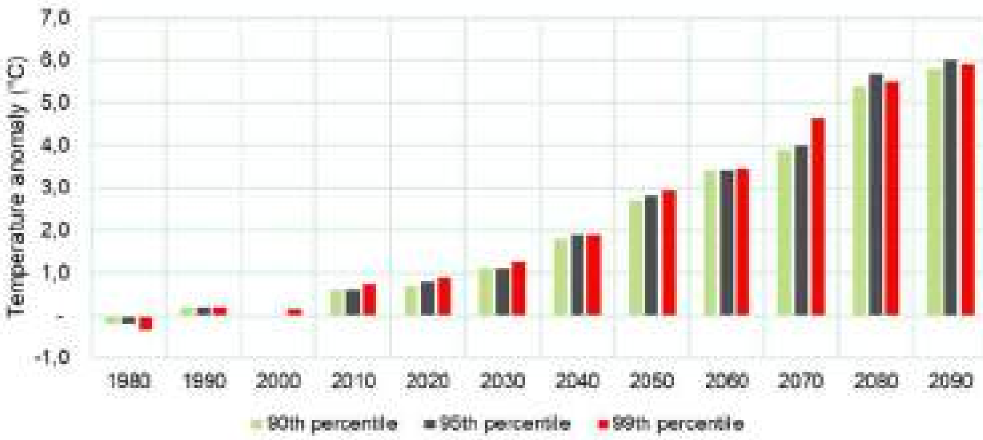


Figure 5.11 Change in extreme temperatures days: RCP8.5

5.2.1.5.1.5 Heatwaves

Figure 5.12 shows that, historically, the number of heatwave events is around 5 - 10 three-day events per year, and these have increased over time. As shown in Figure 5.13, the projected number of events from 2030 to 2050 indicate increases in the number of events, from 17 to 25 (RCP4.5), and to 28 (RCP8.5), heatwave events per year.

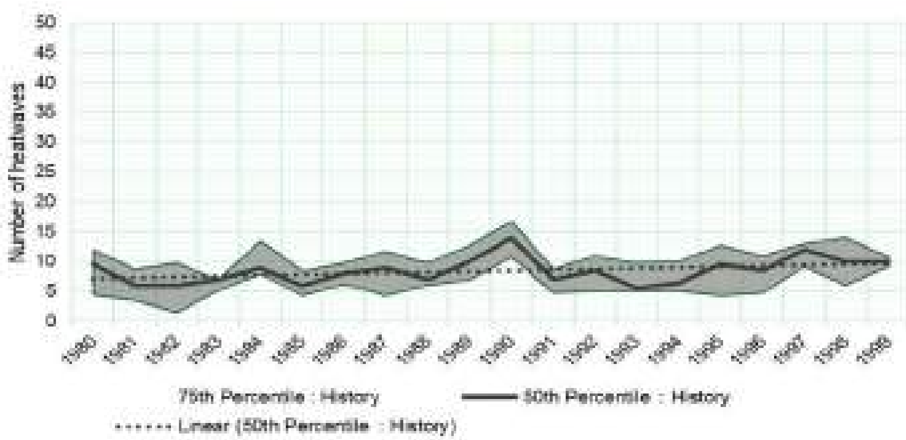


Figure 5.12 Number of 3-day heatwaves per year: historical 1980-2000

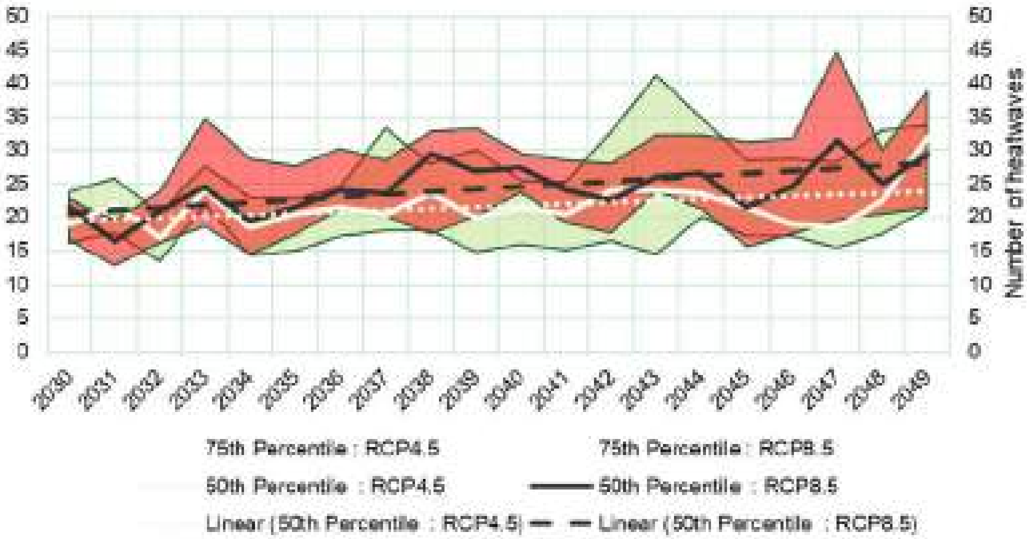


Figure 5.13 Number of 3-day heatwaves per year: projected 2030-2050

5.2.1.5.2 Minimum temperature

5.2.1.5.2.1 Annual

Figure 5.14 presents a strong increase in the minimum temperature. RCP4.5 tapers at around 2050, while RCP8.5 increases throughout to reach an approximate 20℃ in 2100, from 14℃ in 1985. The trend reflects an approximate 0.26℃ per decade, with a 95% confidence at 0.17℃.

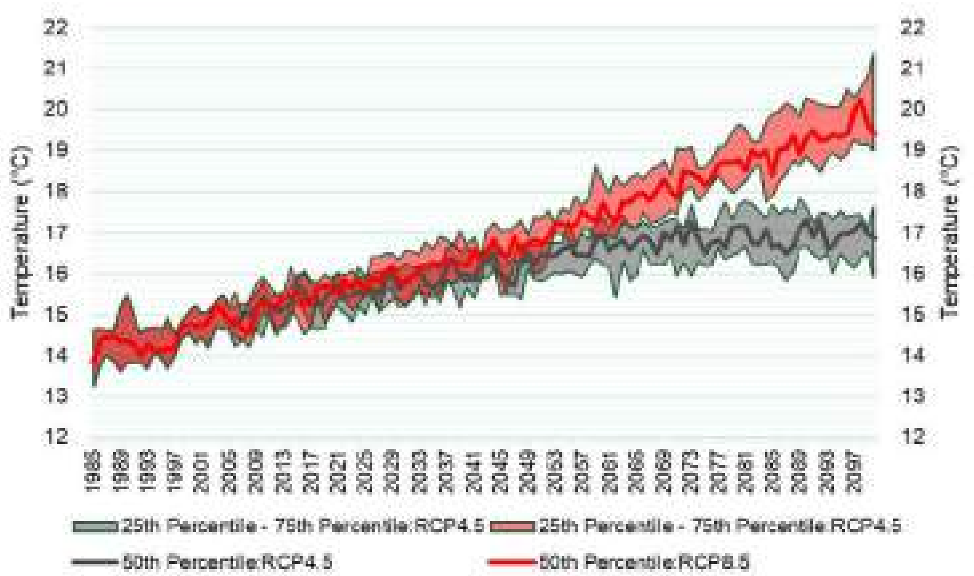


Figure 5.14 Projected average minimum temperature

Figure 5.15 shows that the trend across decades is strongest in the period between 2020 and 2050. RCP4.5 tapers at this point, but RCP8.5 continues to increase, particularly towards the latter part of the century.

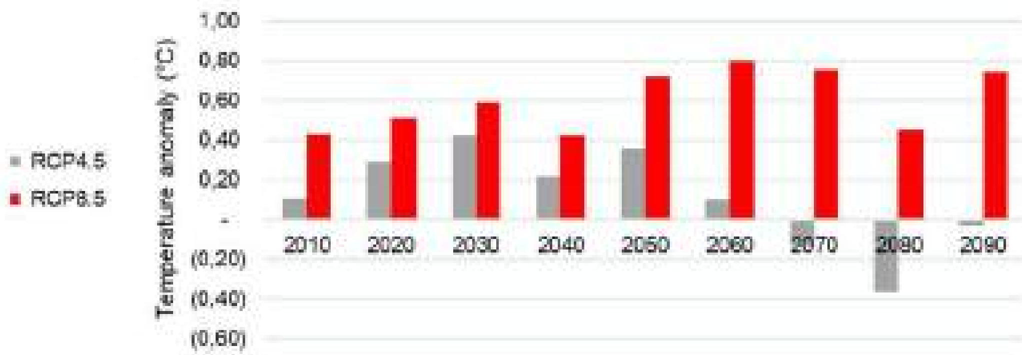


Figure 5.15 Decade trend anomaly

5.2.1.5.2.2 Monthly

Figure 5.16 shows an approximate increase of 1-2℃ every month for the decades going forward, most notably in the cooler winter months. RCP 8.5 has significantly higher increases.

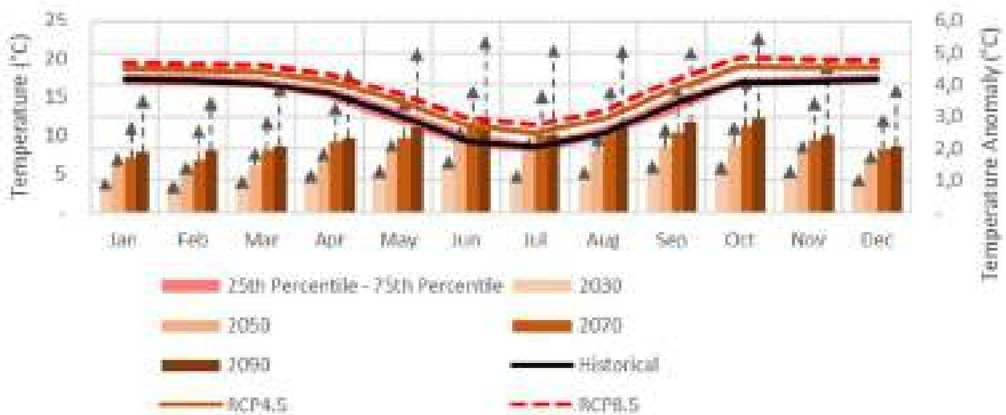


Figure 5.16 Projected monthly temperature

5.2.1.5.2.3 Profile

The monthly temperature profile shows the range of likely temperatures. Figure 5.17 indicates that these peak in the summer months. Historically, the peak was at approximately 22℃ (Figure 5.17A). Projected RCP4.5 (Figure 5.17B) shows the peak temperature at approximately 23-24℃, while RCP8.5 is above 25℃ (Figure 5.17C). The colder months also show large increases from 14℃ historically, to approximately 18℃ in July RCP8.5.

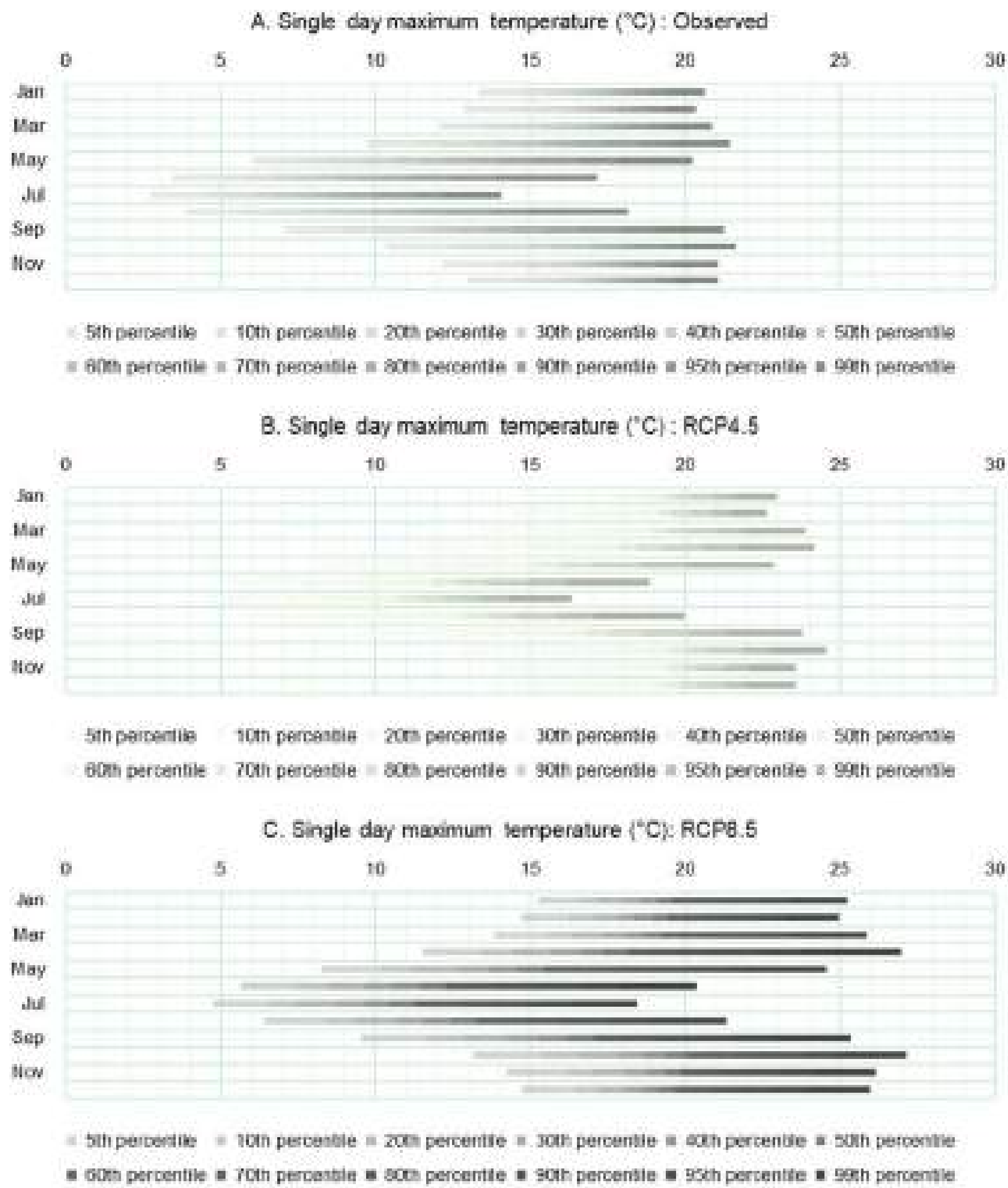
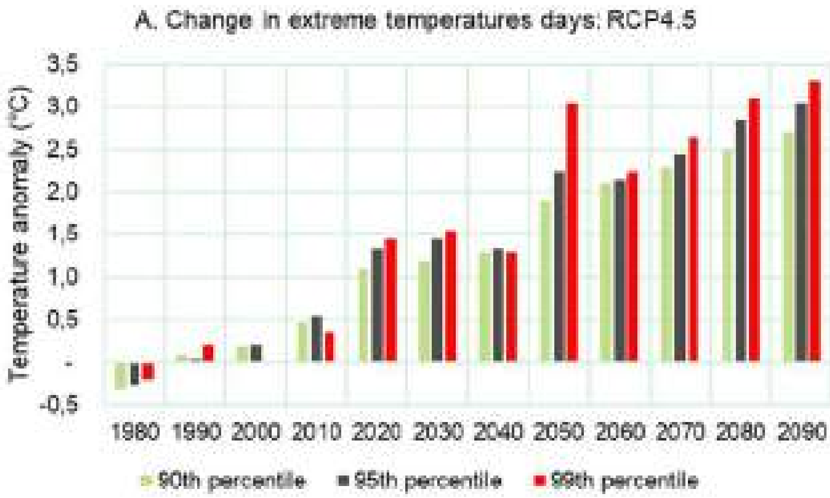


Figure 5.17 Single day maximum temperature (°C)

5.2.1.5.2.4 Extreme temperature days

The increase in the extreme temperate range is much higher in RCP8.5 (Figure 5.18B), an increase of up to 6℃ by 2100, and an approximate 3℃ in RCP4.5 (Figure 5.18A). The 90th, 95th and 99th percentile changes are all increased and are indicative of the changes in the full temperature profile.



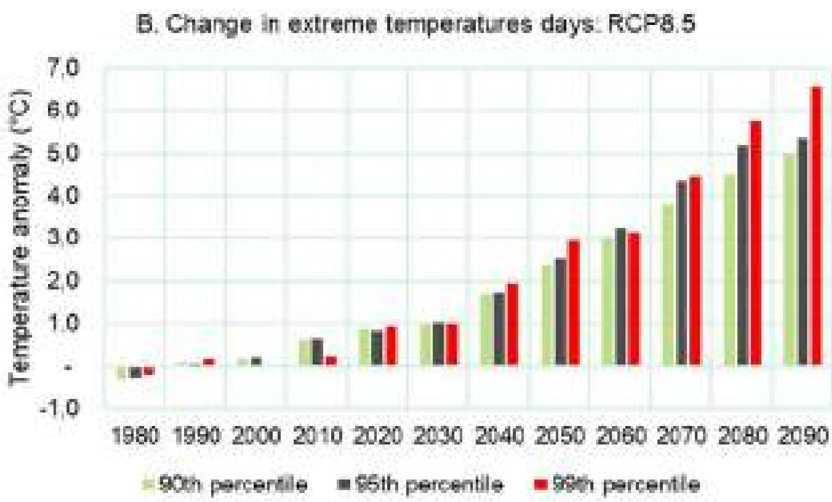


Figure 5.18 Change in extreme temperatures days

5.2.1.5.3 Precipitation

5.2.1.5.3.1 Annual

Figure 5.19 indicates a gradual long-term trend of increased precipitation. The trend is approximately 1.78 mm per decade, with a 95% confidence at 10.27 mm per year.

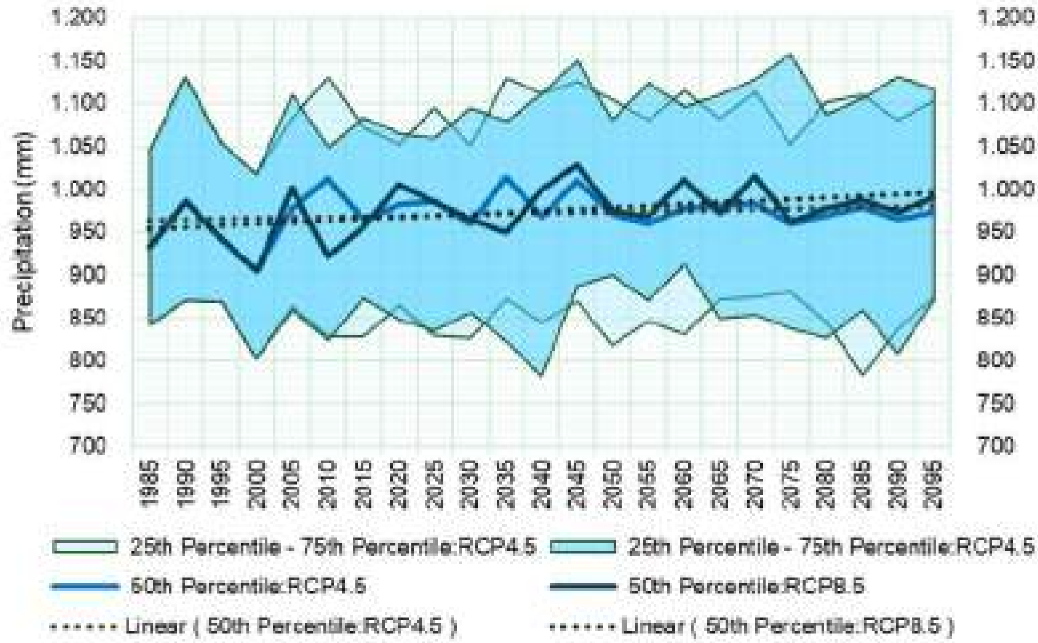


Figure 5.19 Projected precipitation

Figure 5.20 indicates that the trend across decades is strongest in between 2030 and 2040, but then tends to decrease in the latter part of the century, particularly in RCP8.5.

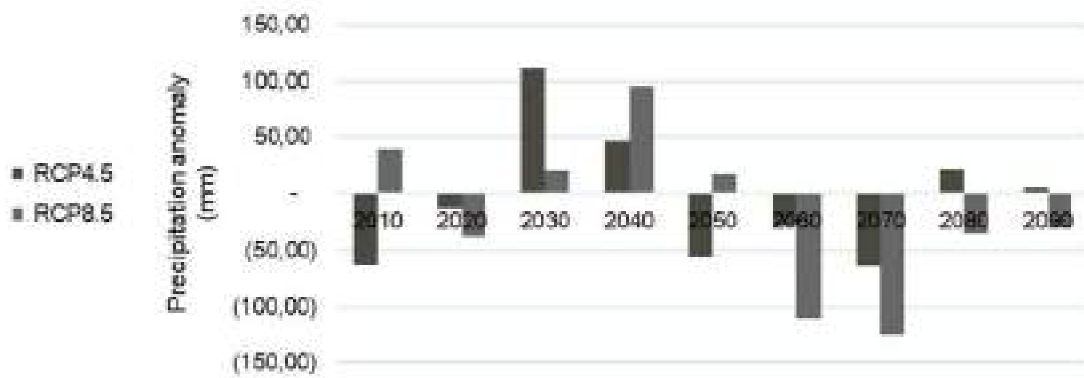


Figure 5.20 Decade trend anomaly

5.2.1.5.3.2 Monthly

Figure 5.21 shows precipitation is focussed in November to February for both RCP4.5 and RCP8.5 and for most decades. There is approximately a 10 mm increase per month. The shoulder seasons of March and October reflect a decrease. The dry season becomes longer, and a more focussed rainfall period is experienced.

Figure 5.21 Projected monthly precipitation

5.2.1.5.3.3 Profile

Figure 5.22 indicates that there are fewer occurrences of days with lower precipitation volumes (0.5 - 7.1 mm/day), while events that are larger in nature (13.7 - 33.5 mm/day) show an increase in the projected future. These increases are larger in the RCP8.5 future, which sees 17 mm/day increasing from 0.72% (RCP4.5) to 0.82% (RCP8.5). Most of the higher-magnitude events reflect this same increased occurrence.

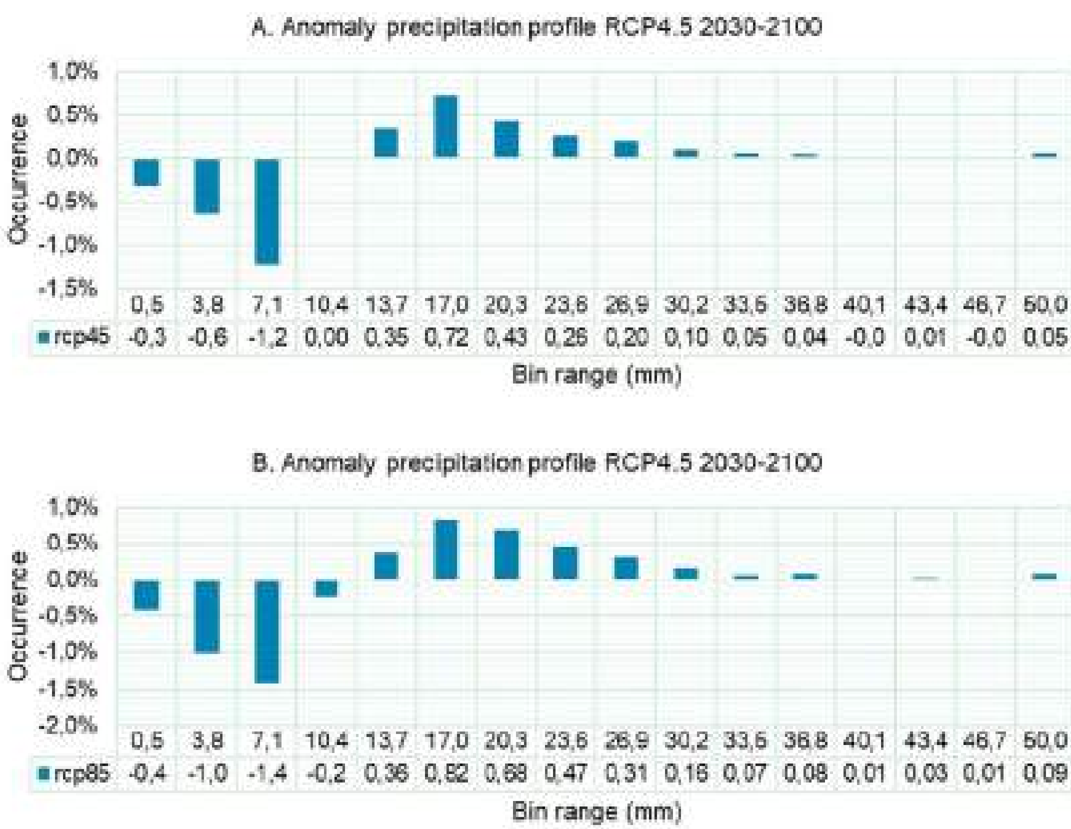


Figure 5.22 Anomaly precipitation profile

5.2.1.5.3.4 Standardised Precipitation Index (SPI)

The SPI is widely accepted as the preferred index for meteorological drought. It quantifies years as varying degrees of wet and dry. There are likely more increased precipitation years (Figure 5.23). However, most years per decade are near-normal.

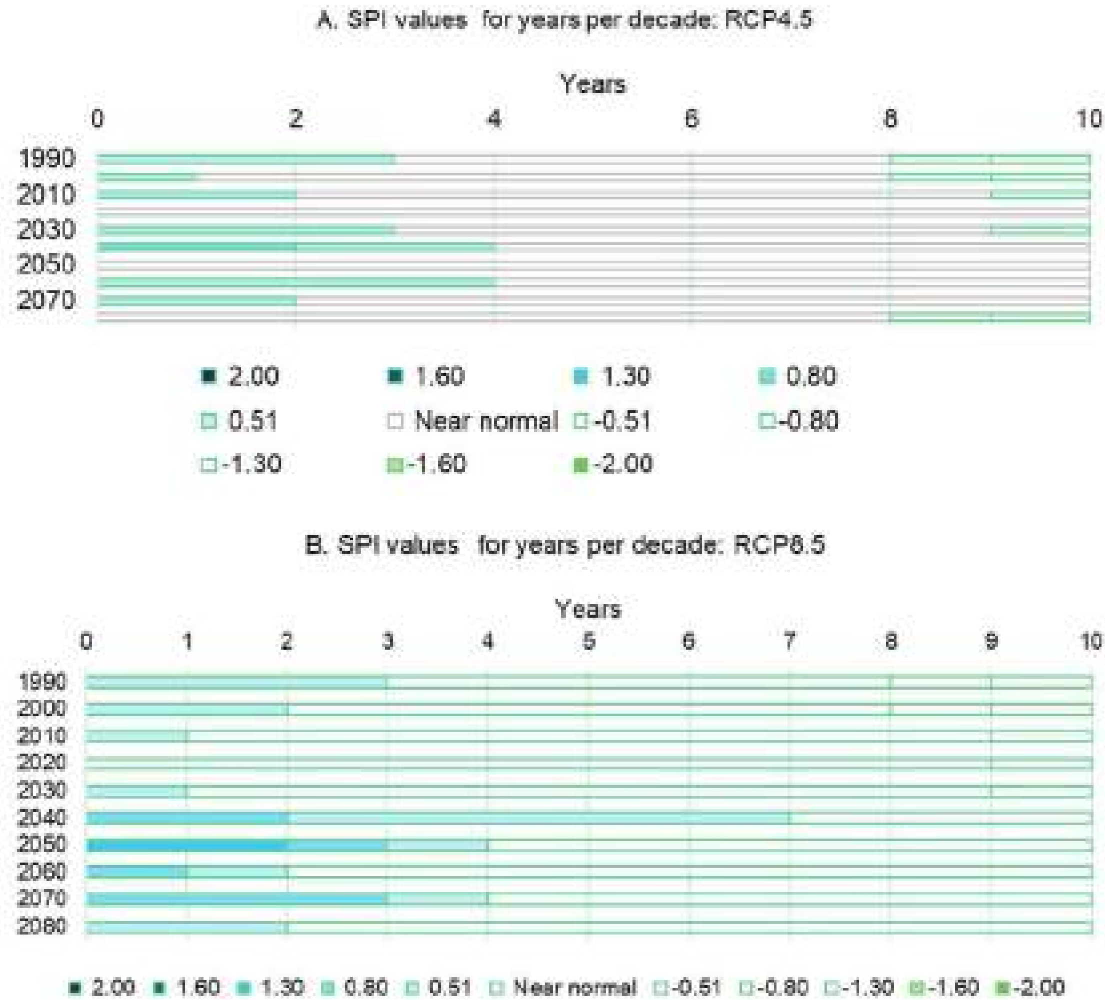


Figure 5.23 SPI values for years per decade

5.2.1.5.3.5 Event return

The previous 1:100-year event is predicted as being 1:73 and 1:71 under RCP4.5 and RCP8.5 respectively (Figure 5.24). This decrease in the number of years is reflected in each of the return thresholds. Therefore, these large events will occur more frequently in the future.

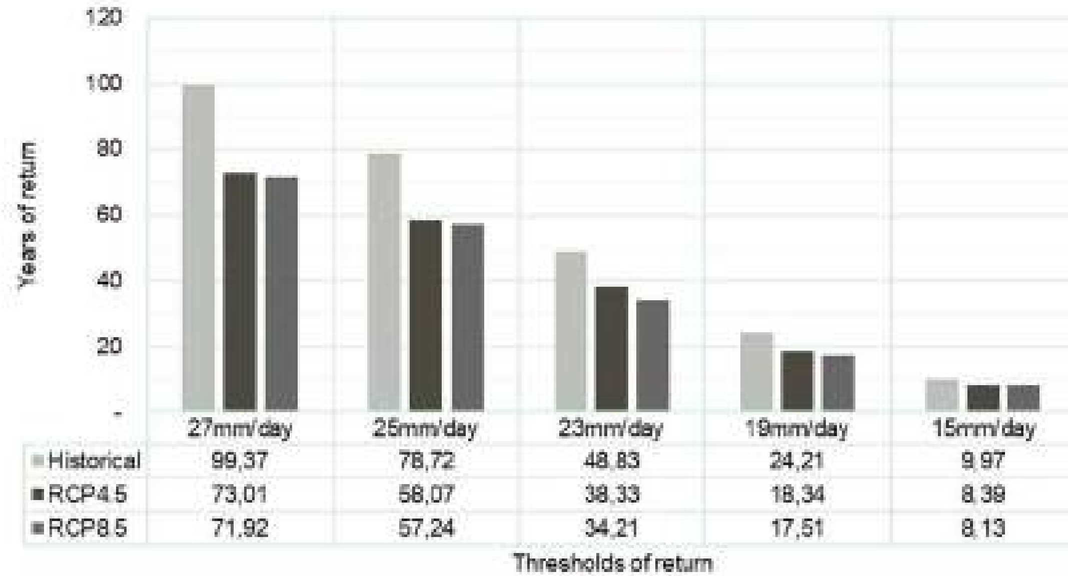


Figure 5.24 Change in event return (years) 2030 - 2050

Reassessment of the magnitude of the 1:100-year events (and other thresholds) shows that these events have an increase in total precipitation volume (Figure 5.25). The 1:100-year event indicates an increase in magnitude of approximately 7%. Other thresholds also show an increase in magnitude. This increase in magnitude is therefore prevalent over the precipitation profile.

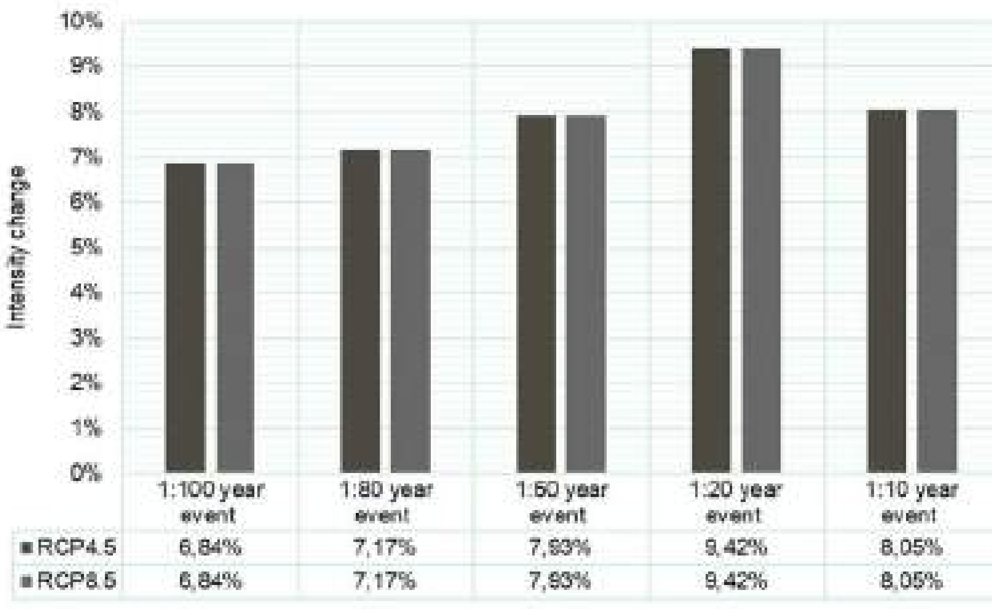


Figure 5.25 Change in event return magnitude (%) 2030 – 2050

5.2.1.5.4 Precipitation intensity

5.2.1.5.4.1 Annual

Figure 5.26 shows a strong long-term trend of increased precipitation intensity. The trend is approximately 0.06 mm/hour per decade, with a 95% confidence at 0.05 mm/hour.

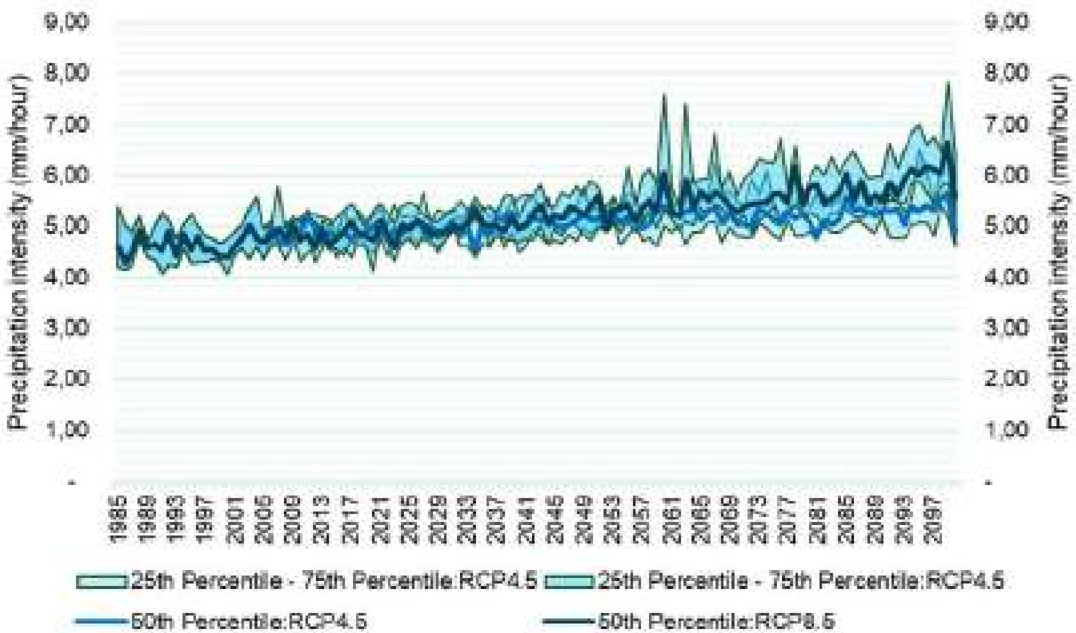


Figure 5.26 Projected precipitation intensity

5.2.1.5.4.2 Monthly

Precipitation intensity is focussed in October to March for most decades. There is an increase of approximately 0.4 mm/hour for each month. This is the hourly maximum intensity so there will be an increase over all hours for the precipitation event.

Figure 5.27 Projected monthly precipitation

5.2.1.5.4.3 Profile

There are fewer occurrences of days with a lower precipitation intensity (0.1 – 2.9 mm/hour), while events that are larger in nature (more than 3.3 mm/hour), show an increase in the projected future (Figure 5.28). These increases are larger in the RCP8.5 future, which sees 3.3 mm/hour events increasing from an anomaly of 0.78% (RCP4.5) to 0.82% (RCP8.5). Most of the higher-magnitude events have this same increased occurrence.

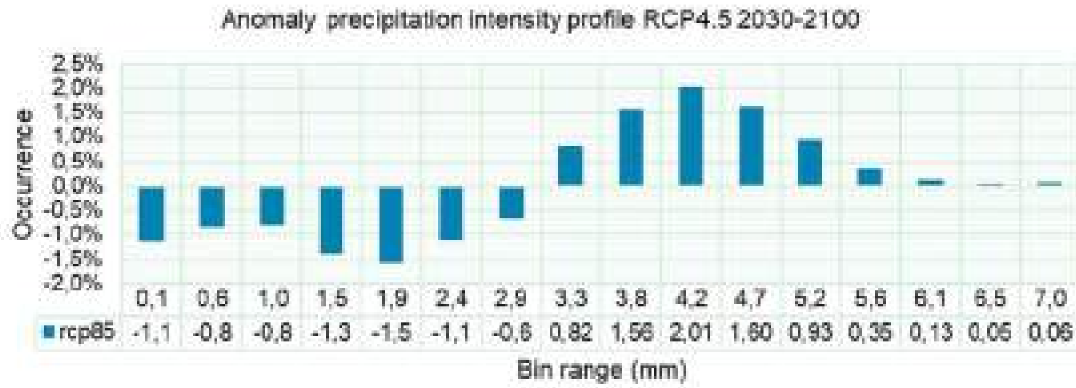


Figure 5.28 Anomaly precipitation intensity profile

5.2.1.5.4.4 Event return

The previous 1:100-year event intensity is now predicted as being 1:40 and 1:30 under RCP4.5 and RCP8.5 respectively. This decrease in the number of years is reflected in each of the return thresholds.

Reassessment of the magnitude of the 1:100-year events (and other thresholds) shows that these events have an increase in total precipitation volume (Figure 5.29). The 1:100-year event shows an increase in magnitude of approximately 9.5% for RCP4.5 and 11% for RCP8.5. Other thresholds also show an increase in magnitude.

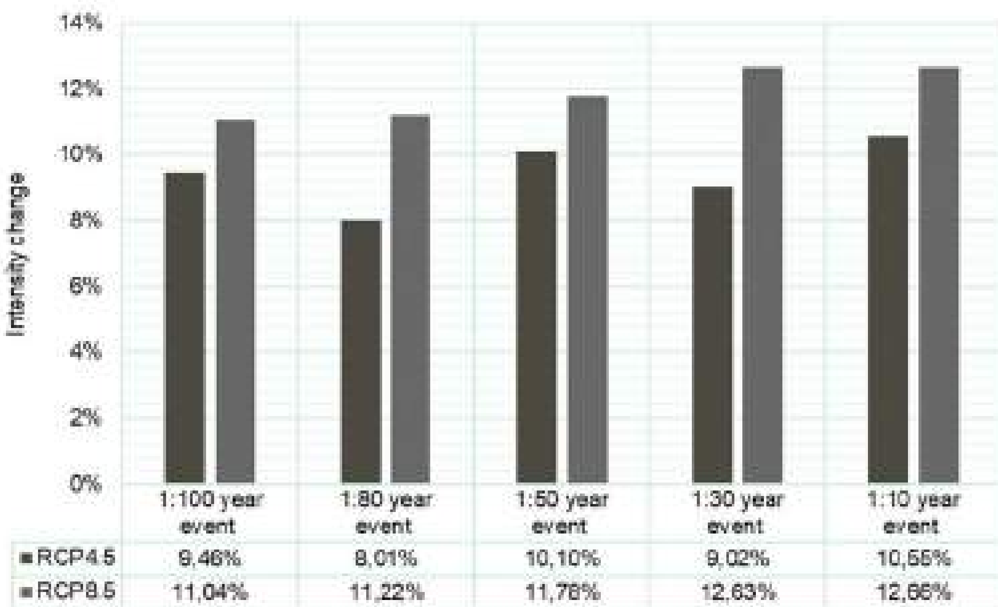


Figure 5.29 Change in event return magnitude (%) 2030 - 2050

5.2.1.6 Summary of future climate analysis

Table 5.6 summarises the future climate analysis per climate variable.

Table 5.6 Summary of future climate analysis

Climate variable or phenomenon	Summary of figures
Maximum temperature	Annual maximum temperature shows an increase to approximately 31ºC to 34℃ by the end of the century from previously 29℃ in 1985, with some decades being warmer than others. In addition, every month will be notably warmer than historical timeframes.
Extreme temperature days	Extreme temperature days will likely increase in frequency and increase by approximately 3 to 6℃ by the end of the century.
Heatwaves	The number of three-day heatwave events per year will increase by 8 from approximately 17 per year in 2030 to 25 (RCP4.5) and 28 (RCP 8.5) in 2050. This is a significant increase from the historical (i.e. years from 1980 – 1999) number of 5-10 three-day events per year.
Minimum temperature	Annual maximum temperature shows an increase by approximately 17 to 20℃ by 2100 from previously 14℃ in 1985, with some decades being warmer than others. In addition, every month will be notably warmer than historical timeframes.
Precipitation	There is a gradual long-term trend of increased annual precipitation, but shoulder seasons of March and October show a decrease. The dry season becomes longer, and a more focused rainfall period is experienced. Thus, shorter more intense rainy seasons are expected to be experienced in future. Events that are considered larger in nature (13.7 - 33.5 mm days) show an increase in the future as 1:100-year events are predicted to occur more frequently (approximately every 71 to 73 years). There will be an increase over all hours for the precipitation event and precipitation intensity will increase likely resulting in flash floods.

5.2.1.7 Climate change vulnerability

Angola is considered to be one of the most vulnerable countries to the effects of climate change in sub-Saharan Africa. In the Huíla and Cunene Provinces (especially the latter), variable and extreme climate is possible, with regional reductions of rainfall. Estimates of climate change impacts on natural resources alone (agriculture and fisheries) will affect mostly the poor because they are highly dependent on natural resources. Angola's rural communities and the poor are the most vulnerable to the negative impacts of climate change. This vulnerability is exacerbated by poor service delivery to remote areas as such endeavours are generally considered prohibitively expensive. In addition, low population densities, long travel distances and the lack of infrastructure increase Angola's vulnerability to climate change. Increasingly, the adaptive capacities of farmers, pastoralists and natural resource managers are compromised.

5.2.2 Geology and geomorphology

5.2.2.1 Geomorphological framework

Due to its morphological and structural characteristics, the territory of Angola is divided into two parts: the western and the eastern parts. In the eastern part, the accumulation relief is characteristic, while in the western part, the denudation relief predominates, with intense current erosion phenomena. The western part of Angola encompasses the Central Plateau with the staircase relief zone, the Maiombe denudation plains, the Kwanza-Plain plains, the Zenza-Loge plateau, the Cuango Plain with the depression (or low), Cassanje, the coastal plain, as well as the accumulation plain of Namibe.

The study area, according to Araújo & Guimarães (1992), is located on three large geomorphological units. These are, from north to south, the central plateau, the eastern plain and the Cunene proluvial plain (Figure 5.30).

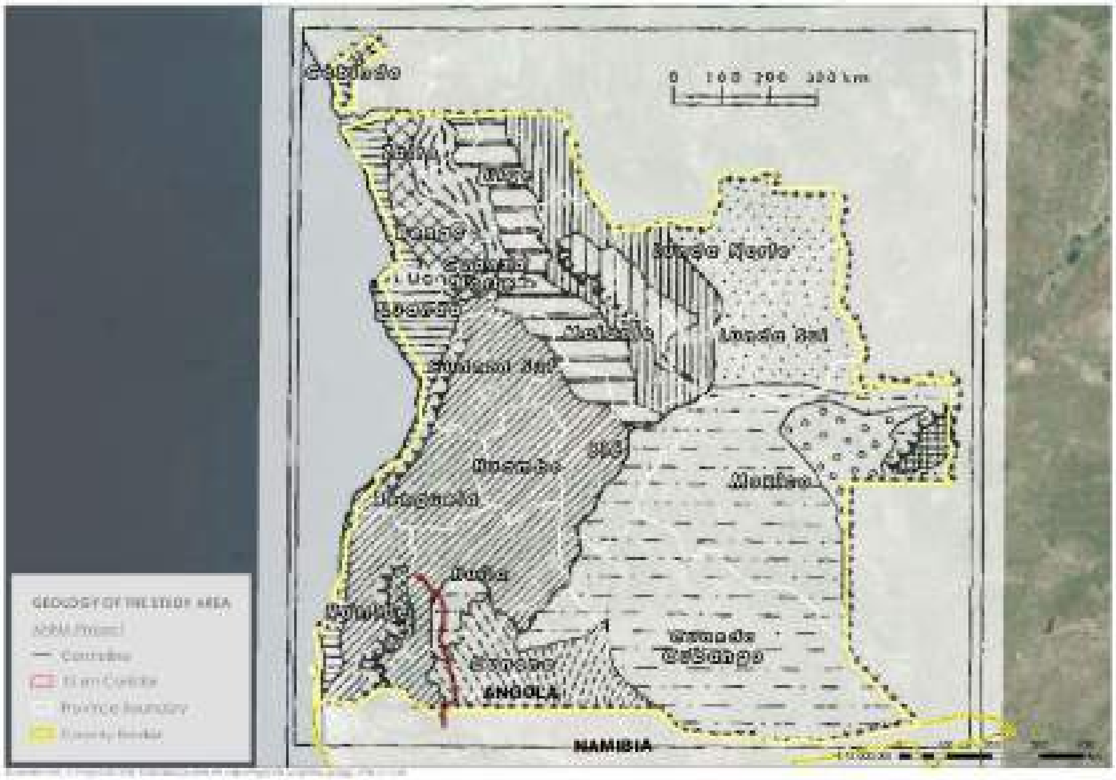


Figure 5.30: Geomorphological layout of Angola

The Central Plateau is described in Araújo & Guimarães (1992) as follows: “encompassing the staircase relief terrain, it was formed on the rocks of the Archaic and the Lower Proterozoic of the Angolan shield whose absolute dimensions reach 3000 meters. To the west, the plateau is bordered by the "Great escarpment" and the denuded plains zone in the form of steps leading down to the coastal plain. Farther up the "Great escarpment", the plateau declines to E and SE, passing callously to the accumulation plains. The western part of the plateau is complicated by mountains with table structures. In the interfluvia and in the foothills of the "table" are developed laterite covers. River valleys come in varying forms. In the “Great escarpment” zone, they are deeply embedded, reaching depths of 600-700 meters. In southern Angola, the Humpata plateau massif, with quotas reaching 2300 m, is the extension of the Central Plateau. To the west, this massif is bordered by the “Great escarpment” while to the east, it passes smoothly to the accumulation plains. In the south is carved in the plateau the valley of the river Curoca with the depth of 200-240 m.”

The eastern plain consists of the formation of ocher sands of the Kalahari Group. According to Araújo & Guimarães (1992), the south-western part of the plain (extending north to the Lundas) is part of the Okavango morphostructure. In this, according to the same authors, “the maximum dimensions of 1 000 meters are marked, with the river valleys embedded at a depth of 100 to 150 metres (m). In the valleys, neotectonic steps are observed. In section, the valleys are in the shape of “U”. At the southern end of the plain are depressions originated by denudation and deflation, latitudinally oriented, closed and open, forming mazes. In many depressions (lows), reception lakes are located.”

The morphostructure of the Okavango depression encompasses plains with sands and clays of Plistocene-Holocene age and, at its south-western limits, lies the plain of the Cunene River basin. Araújo & Guimarães (1992) describes it as follows: “In plan, it resembles a funnel that opens to the South. The extension of the plain from North to South is 200 km, and its width along the Angolan border of 160 km. In the NW part of the plain, the drainage is directed towards the Cunene River, while in the SE part the waters drain towards the receiving lake Etosha (located in Namibia). In modern times, part of the upper section of the Cunene river was captured by other rivers that flowed into the Atlantic Ocean. During floods, the whole plain is covered by water." According to C. A. Neves Ferrão, on the surface of the plain, the following relief mesoforms can be distinguished: "mufitos", "ecangos", "mulolas" and "chanas" (local names). "Mufitos" are elevations covered by sandy deposits, with arboreal and shrubby vegetation; "Ecangos" - depressions of asymmetrical or oval shape, with superficial clay layers covered by saline film; "Chanas" are long elongated widths up to 500 m, sometimes with shallow layers of clay; "Mulolas" are narrow, usually sandy, watercourses.

In altimetric terms, the study area rises between 900 and 1 700 m, progressively decreasing from north to south (Lubango – 1 700 m; Dongue, Chibemba – 1 370 m; Cahama, Calovango and Techipa – 1 200 m; Namibian border – 900 m) (refer Figure 5.32).

In the study area, flattened areas with slopes of less than 2%, are dominant, although to the east of Chibia there are several hills (rocky outcrops that stand out in the landscape) of anortositic rocks (Figure 5.31).

Figure 5.31: Contrasting morphology with the surrounding flatness

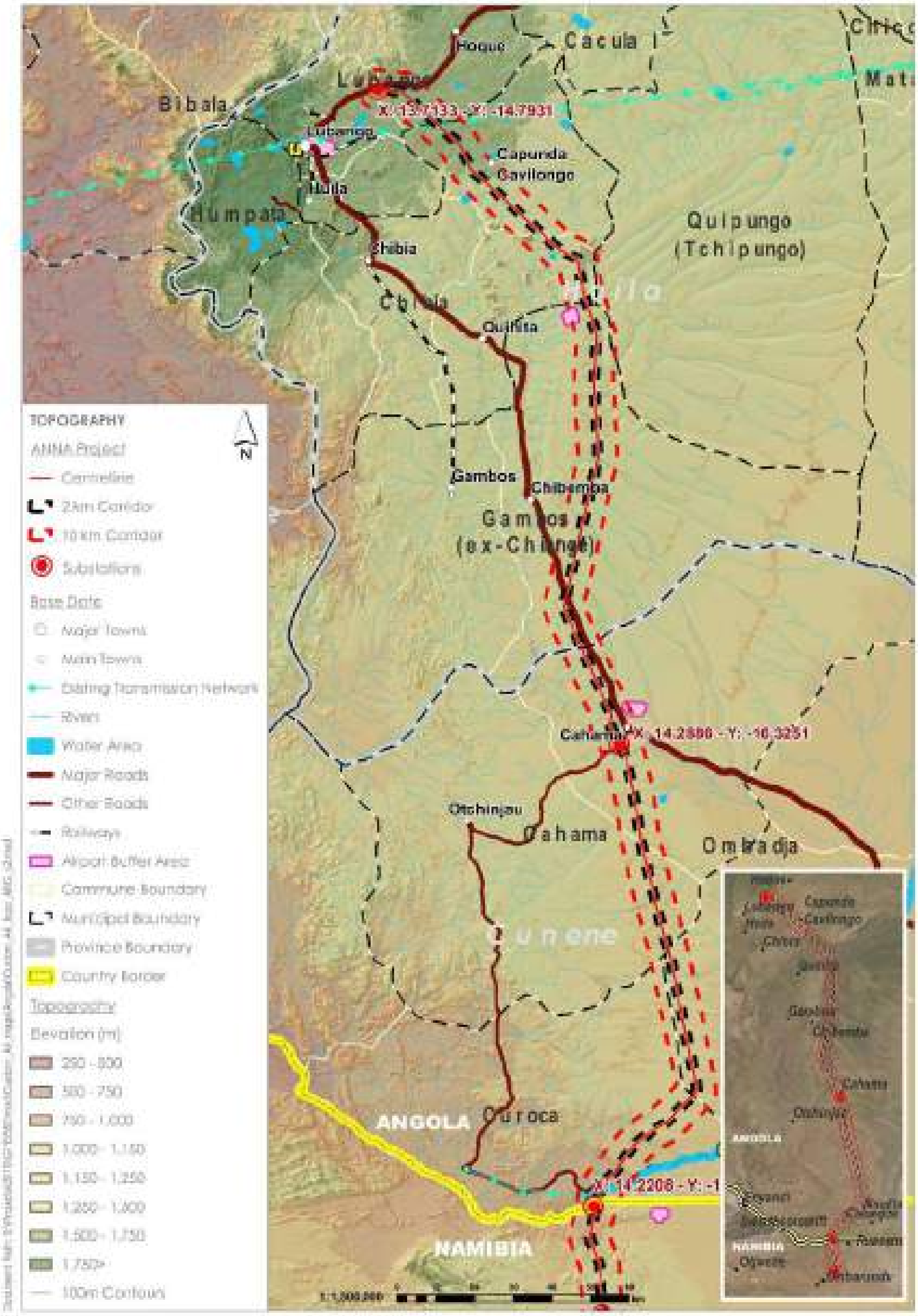


Figure 5.32: Regional hypsometric outline

5.2.2.2 Geological framework

The geology of the region is dominated by formations of diverse nature (magmatic, metamorphic and sedimentary), chronologically framed between the Lower Archaic and the Quaternary (Figure 5.33). According to the Geological Chart Explanatory Notes 1: 1,000,000, co-ordinated by A.G. de Araújo and Filomena Guimarães (1992), it can be characterised by the intersected formations, from north to south, as follows (Figure 5.33):

- **Upper Archaic (or Late Archaic) Biotic Granites (γAR2)**

  Widely developed in the area of the granitoid rock complex (from granites to diorites), autochthonous and para-autochthonous varieties are distinguished. They are often observed in the genees xenolith granites and biotitic, micaceous and amphibolic shales. Its greatest development is in the shield area of Angola, while the Maiombe and Cassai shields appear only in the form of relatively small massifs, in association with the metamorphic and ultra-metamorphic rocks of the Archaic.

- **Anortosites, gabbroanorthosites and troctolites of the Cunene Complex (Lower Proterozoic) (nPR1)**

  The Cunene intrusive rock complex includes, in addition to the basic and ultrabasic rocks that form part of the large Cunene massif, several relatively small intrusions to the north and west of the Cunene massif. The massif is located in the south of the shield of Angola and its outcropping extends from north to south for about 350 km (from the village of Matala to the Cunene River), reaching a width of 100 km. Two massive groups of intrusive rocks are part of the massif. The first and oldest, is represented by anortosites, gabbro-anortosites, troctolites, gabbro-norites, peridotites, dunites and pyroxenites, being considered as the Cunene complex. The second, more recent, encompasses granite rocks and is identified as the Matala red granite complex.

- **Kalahari Group. Polymorph sandstone formation. Sandstone, silicified rocks, conglomerates. (P2-N1k1)**

  The "polymorph sandstones" (sedimentary deposits of continental origin) constitute the lower formation of the Kalahari Group, which only appears locally at the bottom of the river valleys. This formation consists of white, yellow, violet and, more rarely, red, sandstone and lithified sand. At the base of the formation are breaches with chalcedony and lateritic fragments, sometimes basal conglomerates and gravels. Its composition is always similar to that of the mesozoic or older underlying rocks. Farther up, feldspar-quartz sandstone occurs, followed by essentially quartz sandstone of varying particle size (from fine to coarse) with graded or cross-stratification. At the top are weakly lithified, friable clay fragments. The formation presents, mainly in the inferior part, silicified layers with sandstone wrapped in a chalcedony or opal cement and chalcedonic and chalcedonite intercalations. The thickness of the "polymorph sandstone" is several tens of metres, reaching upstream of the Mucane River (right bank of the Cunene River), 56 m . The period of formation is still under discussion, with different authors admitting eocene or oligocene-myocene age.

- **Kalahari Group. Ocher Sand Formation. Sands, clays. (N1-N21kl2)**

  Formation widely represented in the region. In terms of grain size, it exhibits high homogeneity, consisting of fine quartz (0.1-0.5 mm) sands. The mineralogical composition also includes clay minerals and iron hydroxides (giving yellowish, orange and/or reddish colours) and, with less expression, zircon, rutile, tourmaline, staurolite and cyanite.

  This sequence is characterised by the absence of stratification. The passage of the "polymorph sandstone" underlying the "ocher sands" is clear, succeeding the lithified rocks, the friable rocks. At the base of the "ocher sands", ferruginous films and quartz grains with iron oxides are observed. Sometimes the "ocher sands" lie directly on the basement rocks or mesozoic deposits.

  In the Okavango depression, in the upper section of the Lungué-Bungo River, on the upper part of the "ocher sands", beds of clays and lignite, with thicknesses ranging from several tens of centimetres to two metres, are observed. The fossils found are very poorly preserved. With rare exceptions, deposits of formation are not fossiliferous. The "ocher sands" overlap quaternary aeolian, lake or deluvium-eluvial origin deposits.

  The thickness of this formation ranges from tens to 120 metres, with a high probability of reaching 200-300 m in some parts of the Okavango depression.

- **Undifferentiated Quaternary. Sands, Alluvium-Proluvial Clays (apQ)**

  Quaternary deposits occupy wide areas in the territory of Angola, being represented by several genetic terms. Among them, plistocene deposits of marine terraces, deluvium-eluvial quaternary deposits, proluvial-alluvial and wind deposits, holocene alluvial deposits and beach and marine terraces deposits, were defined.

- **Holocene. Sands, Alluvial Gravel (aQIV)**

  These sedimentary deposits are alluviums of varying thicknesses and equally variable textural composition.

- **Quibala Granites. Lower Proterozoic Leucocratic Granites (LγPR1)**

  Regarding genesis, these Quibala leucocratic granites result from the granitisation of Metamorphic rocks of the Lower Proterozoic and the deep remobilisation of metamorphic and ultra-metamorphic rocks of the Archaic.

  In the Angola Shield, the largest massif of these granites was located near the villages of Jamba, Indungo, Cassinga and Cuvelai. Several relatively small intrusions were mapped to the west and south-west of the Cunene Complex (where the project corridor is located).

  Leucocratic granites generally appear in association with porphyroblastic granites, showing gradual mutual passages. Specific features of these rocks are the predominance of potassium feldspar over plagioclase and relatively small amounts of mafic and accessory minerals (magnetite, apatite, sphene and sometimes zircon). They are of uniform grain size. However, porphyroblastic and banded varieties are observed.

- **Oendolongo Group. Conglomerates, quartzites, sandstones, siltstones, greywacke, mycaceous shales, Lower Proterozoic itabirites (PR1on)**

  Essentially composed of terrestrial formations (conglomerates, sandstone, quartzites and itabirites, also emerging siltites and metaxists), it includes rocks of volcanic origin (acidic, medium and basic composition). The Oendolongo Group develops in parts of the western and south-western Angola Shield, where it outcrops in the Cuvo, Catumbela river basins and along numerous tributaries of the left bank of the Cuanza and Cunene rivers.

  The thickness of the group ranges from 350 m to 1000 m, peaking near the village of Chipindo.

  Near the green rock trough (Cassinga area), the Oendelongo Group is represented by a volcano-sedimentary complex. Quartzites and conglomerates (from tens to several hundred metres), covered by volcanic rocks, namely dacites, rhyolites, albitophyres, spifits, and at the top, manganiferous black schists and greywackes occur.

- **Gabbro-norites and norites of the Cunene Complex (Lower Proterozoic) (νPR1)**

  The gabbro-norites and norites occupy considerably smaller extensions compared to the rocks of the early phase, having formed somewhat later than those. Gabbro-norites and norites are characterised by fine granularity and a more melanocratic appearance compared to anorthosites and embedding troctolites. In most cases, they appear in the form of relatively small bodies, or rows of bodies, at, or outside, the boundary of the massif. Two bodies of these rocks of considerable size were individualized in the southern part of the Cunene massif, in the Oncócua and Cahama settlement areas. The isotopic ages of the basic rocks of the Cunene massif, provided by the K-Ar method, range from 1964 ± 61 and 2157 ± 43 M.a.

- **Lower Proterozoic Granite Porphyry ($\gamma\pi$PR1)**

  Granitic porphyry is largely developed in the north-western part of the Angolan Shield and is located in the area of development of Quibala porphyroblastic granites. Its location usually corresponds to the highest dimensions of the land. Similar to Quibala's porphyroblastic granites, granitic porphyries reveal gradual passages to their Upper Archaic nesting granitoids. Granitic porphyry are mostly recrystallized.

- **Lower Archaic Upper Group (AR12)**

  A group consisting of gneisses: biotitic-hornblendic, biotitic-hyperstenic, bimicaceous grenade with distena and graphite; amphibolites, biotitic and bimicaceous shales, leptites, quartzites. In ultra-metamorphic zones, the Group consists of tonalites, plagiomigmatites and plagiogranites.

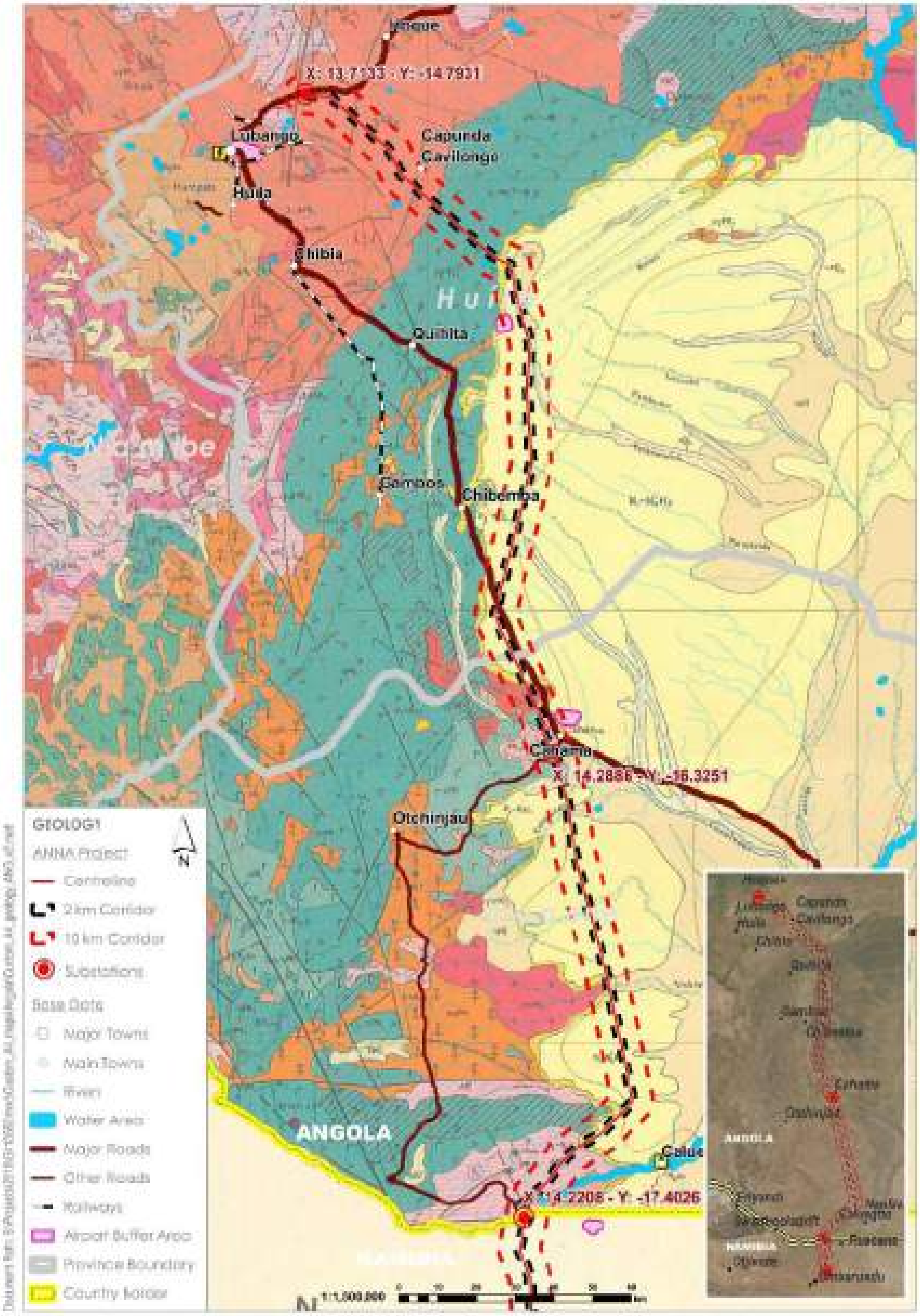
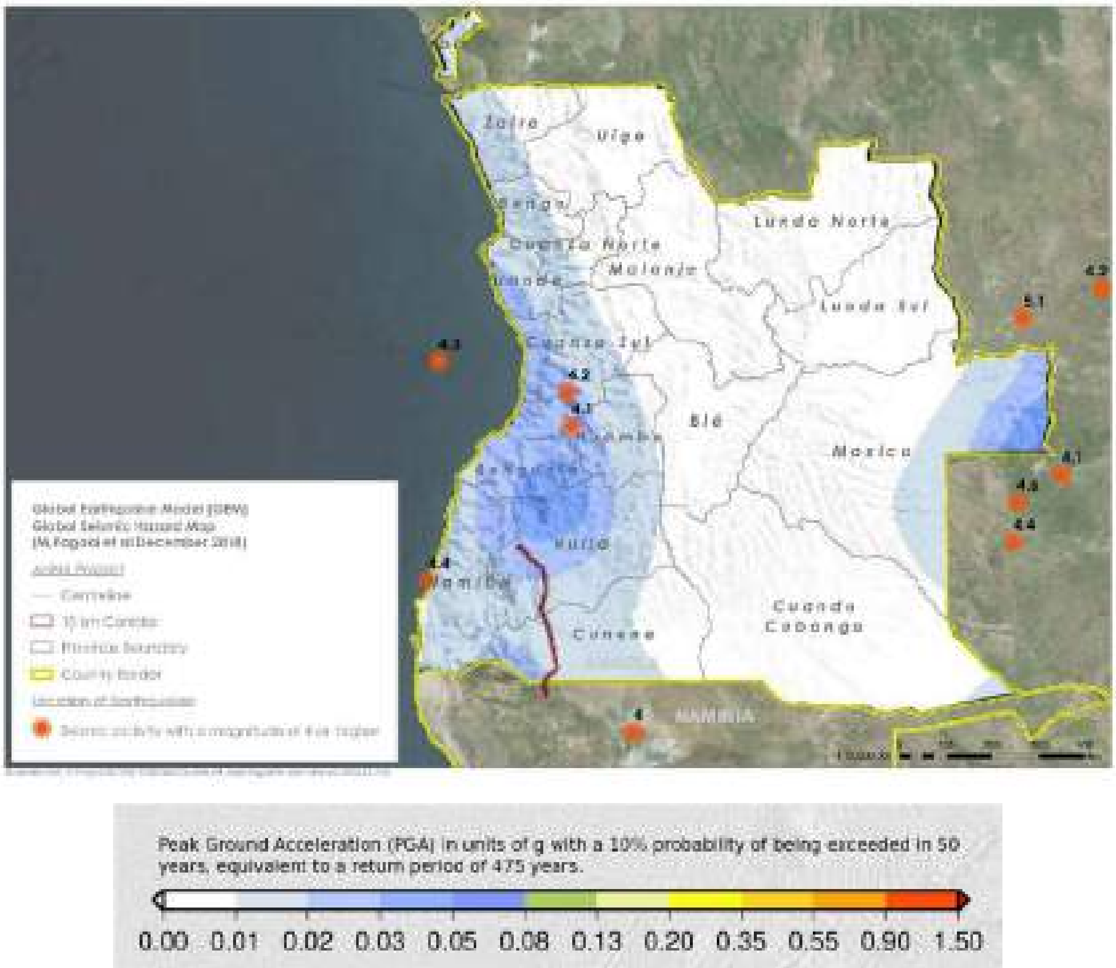


Figure 5.33: Regional geological framework of the study area

According to the same source of information, in terms of fragile tectonics, there are three NNE-SSW faults in the Upper Archaic biotitic granite outcrops, a probable WNW-WSE steering fault near the village of Cahama, and another probable NNW-SSE steering fault near the Namibian border. These are the structures mapped at the 1: 1,000,000 scale, and it is very likely that there will be more faults along the study area.

The region where the study area is located has a low seismic risk (with seismic accelerations ranging from 0.2 m/s^2 to 0.3 m/s^2) (GEM, 2018). It is clear from Figure 5.34 that almost all of Angola is classified in the lowest seismic risk classes.



Source: Global Earthquake Model (GEM) Global Seismic Hazard Map1

Figure 5.34: Extract from African seismic risk distribution map

A search on website http://earthquake.usgs.gov/earthquakes/search/ for earthquakes occurring between longitudes 10º and 25º east, and latitudes between 3º and 20º south, with magnitudes equal to or greater than 4, and for the time period 01-01-2010 to 01-06-2019, returned the results presented in Table 5.7, with cartographic representation in Figure 5.34.

1 http://www.globalquakemodel.org/gem

Table 5.7: Location of epicentres in the territory of Angola and surrounding countries

Magnitude	Location	Co-ordinates (WGS84)	Depth	Date
5.1	142 km ENE from Luau	10,366ºS/ 23,479ºE	10.0 km	24/02/2015
5.0	73 km NNW from Khorixas (Namíbia)	19,769ºS/14,662ºE	10.0 km	24/05/2018
4.8	72 km NNW from Khorixas (Namíbia)	19,777ºS/ 14,664ºE	10.0 km	25/05/2018
4.8	67 km NNW from Khorixas (Namíbia)	19,848ºS/ 14,626ºE	11.3 km	14/03/2018
4.6	50 km SSE from Zambezi (Zâmbia)	13,926°S / 23,361°E	10.0 km	21/04/2014
4.4	30 km SW from Namibia	15,427°S / 11,990°E	10.0 km	14/10/2016
4.4	Zambia	14,692°S / 23,288°E	10.0 km	28/10/2010
4.3	180 km W from Sumbe	11,194°S / 12,191°E	10.0 km	05/10/2018
4.2	75 km NNW from Khorixas (Namibia)	19,737ºS/ 14,683ºE	10,0 km	24/05/2018
4.2	66 km SW from Uacu Cungo (Kwanza Sul, Angola)	11,794°S 14,691°E	15.1 km	19/11/2013
4.2	Democratic Republic of Congo	9,786°S / 24,995°E	10.0 km	26/12/2010
4.1	73 km NW from Longonjo	12,452ºS / 14,757ºE	15.0 km	10/11/2014
4.1	Zambia	13,394°S / 24,222°E	10.0 km	29/02/2012
4.0	Namibia	18,375°S / 15,962°E	10.0 km	11/04/2010

Regarding occurrences of outcrops classified as being of geological heritage with conservation status, no occurrences are identified in available literature. However, in an initiative carried out in 2014 called "Seven Natural Wonders of Angola", one feature was found in the province of Cunene: Ruacana Falls (category Waterfalls).

The project corridor does not impact on this feature, even though it is in close proximity.

5.2.2.3 Potential and existing geological resources

Approximately 250 deposits and mineral occurrences of economic interest are known in Angola. The most important deposits are oil, gas, diamonds, iron, manganese, gold, copper, lead, crystalline quartz, muscovite, anorthosites, marbles, bitumen, fluorite, titanium, rock salt and potassium salts (Araújo & Guimarães, 1992).

In this same work, reference is made to the existence of iron deposits related to the basic and ultrabasic rock massifs of the Cunene Complex of the Lower Proterozoic, especially the Gambos and Chitado deposits. These are associated with gabbroanorthosites of the Cunene massif which often reveal high levels of iron (45-50%), titanium oxide (13-15%, possibly up to 25%) and occasionally vanadium (0 4%), chromium (0.16%) and nickel (0.18%). Secondary iron ores were mined here from eluvial deposits until 1975. In the south-west of Angola, there are several areas with titaniferous mineralisations, with ferro-titaniferous ores represented by two geological-industrial types: titanium magnetites of magmatic origin in primary deposits, and ilmenites and titan magnetites in alluvial deposits.

The deposits of magmatic origin are located in the gabbro-norites of the Cunene Complex, with more than 40 such occurrences having been detected. Noteworthy are the occurrences that are located near the villages of Chiange and Chitado. Mineralisation is represented by titanium-magnetite and hematite masses with 13-25% TiO_2 and 45-62% Iron.

In the Cunene massif, secondary ores of ilmenite and titanium magnetite appear in all areas where their primary sources are located. Titanium-magnetite and ilmenite contents in alluvial, eluvial and slope deposits range from 30 to 60 kg/m^3. The deposits that offer the most interest are Muquequete, Chiange, Nihiquilo and Gambos.

Pertaining to non-metallic geological resources, the anorthosite reserves of the Cunene massif are noteworthy. The most extensively studied area, an expanse of 500 km^2, covers the Ofui deposit and several others, located in the northern part of the massif, 70 km south-east from the town of Lubango.

According to the Angola Geographical Atlas - Secondary Education (2008), various occurrences of Titanium and Iron are found as unexplored geological resources in the surrounding region near the Indirect IAI. This information is most likely out of date. In the near future, the results of the National Geology Plan (PLANAGEO) are due to be released, since the national field surveys have already been concluded.

A field survey undertaken in April 2019 identified some non-metallic geological resources exploration works, some in operation and others non-operational. The following are noteworthy:

- A granite quarry 27 km north-east from the city of Lubango;
- An anorthosite quarry 42 km from ENE de Chibia; and
- Two rock quarries of the Oendolongo Group, near Cahama (Figure 5.35).

Figure 5.35: Inactive quarry within the limits of the study area

5.2.3 Water resources

5.2.3.1 Legal framework

Angola's Constitution stipulates that water is State property. The Law on the Delimitation of Economic Activities Sectors (Law no. 5/02 of 16 April) establishes in Article 13 that the abstraction, treatment and distribution of drinking water through networks and sanitation are areas of "relative reserve". This means that companies or other types of private entities can participate in these sectors through fixed-term concession contracts with the State.

The Water Law is established through Law no. 6/02 of 21 June, which defines the management of water resources and water supply. There are specific provisions of the law that are determined through secondary legislation (regulations).

The Water Law provides for the possibility of granting a license or a concession for a private water use. Generally, the license is granted for a period of 15 years, renewable for a period not exceeding 50 years in total.

The Water Law also states that areas adjacent to springs, licensed catchments and artificial lake shores are subject to the protected areas regime defined in the Land Law. It also requires all hydraulic works to be subjected to an Environmental Impact Assessment (EIA) process and prohibits any activities involving the risk of water pollution or degradation, and any alteration to the water regime that could endanger health, natural resources, the environment or security and national sovereignty. This Law implements the "polluter pays" principle by expressly stipulating the obligation to repair damages, and it further defines the regime of fines and associated punitive measures.

In order to complement the Water Law, the National Water Directorate and the Ministry of Energy and Water have developed a Water Sector Development Program, which covers water resources management and water supply and sanitation to the population, approved by the Council of Ministers Resolution no. 10/04 of 11 June.

More recently, the National Institute of Water Resources (NIWR) was created by Presidential Decree no. 253/10 of 16 November, the main duties of which are planning and management of, and the inventory and monitoring, of water resources.

5.2.3.2 Hydrology

In national or regional hydrographic terms, the project corridor is in the Cunene (or Kunene) River basin (Figure 5.36). The Cunene River arises about 32 km north-east of Huambo in the Encoco mountain range in Angola, and flows southwards from the Angolan plateau to the Namibian border, after which it runs westwards, forming the border between the two countries until the river reaches the Atlantic Ocean. The lower course of the river runs through a deep gorge that begins at the Ruacana Falls (source: http://www.kunene.riverawarenesskit.com/).

In the Angolan part of the Cunene watershed there are two hydro-electric plants: Gove (60 MW capacity) and Matala (42 MW capacity)[1].

The data published by DNA (2005) includes the following information regarding the water balance of the Cunene River watershed:

- Basin area;
- Basin perimeter;
- Average and maximum altitude;
- Average, maximum and minimum specific discharge;
- Monthly discharge and annual average;
- Monthly precipitation and annual average;
- Population, population forecast and water use; and
- Animal watering and irrigation (present situation and forecast for the future).

The average annual rainfall in the basin is 704 mm. Some geometric features of the basin, as well as the average runoff values, are presented in Table 5.8.

Table 5.8: Geometric features and average surface runoff in the Cunene basin

Area (km^2)	Perimeter (km)	Average altitude (m a.s.l)	Maximum Altitude (m a. s. l)
113 835	2 390	1 286	2 484
Annual average discharge m³/s (q)	**Annual average specific discharge (q) L s km-2 [Min]**	**Annual average specific discharge (q) L s-1 km-2 [Average]**	**Annual Average Specific Discharge (q) L s-1 km-2 [Max]**
289.5	0.01	2.5	13.7

Data (current and estimated for the future) regarding population and water needs, as well as animal watering and irrigation needs, are presented in Table 5.9.

Table 5.9: Population, water consumption, and animal and irrigation water needs

Population and water consumption (in Angolan territory)				
	2000	**2005**	**2015**	**2025**
Population	2 501 644	3 020 716	4 022 883	5 346 401
Water consumption (m^3/day)	47 286	63 165	143 188	232 963
Water consumption (m^3/s)	0.547	0.731	1.657	2.696
Animal Watering and Irrigation (in Angolan territory)				
	2002	**2005**	**2015**	**2025**
Water consumption (m^3/day)	1 036 862	1 183 202	11 422 476	220 961 622
Water consumption (m^3/s)	12.0	13.7	132.2	249.7

1 Source: http://www.redeangola.info/barragem-da-matala-concluida-em-marco-de-2015/

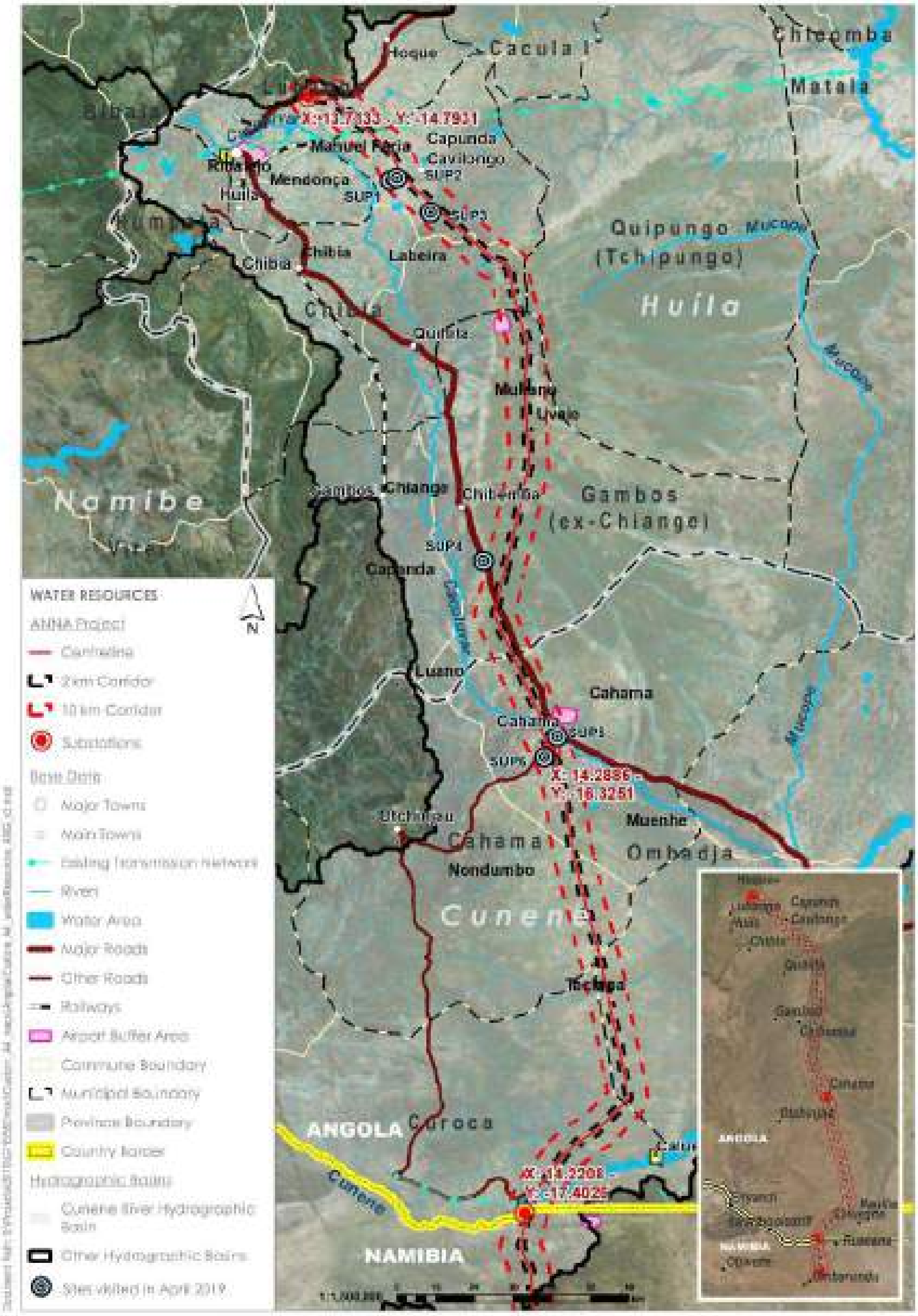


Figure 5.36: Hydrological framework of the Cunene river basin

The average seasonal evolution of both runoff and weighted rainfall at basin level is shown in Figure 5.37. With this data, the report of DNA (2005) concludes that there is no water deficit in the basin in the present situation. However, a shortage of water for future use is predicted.

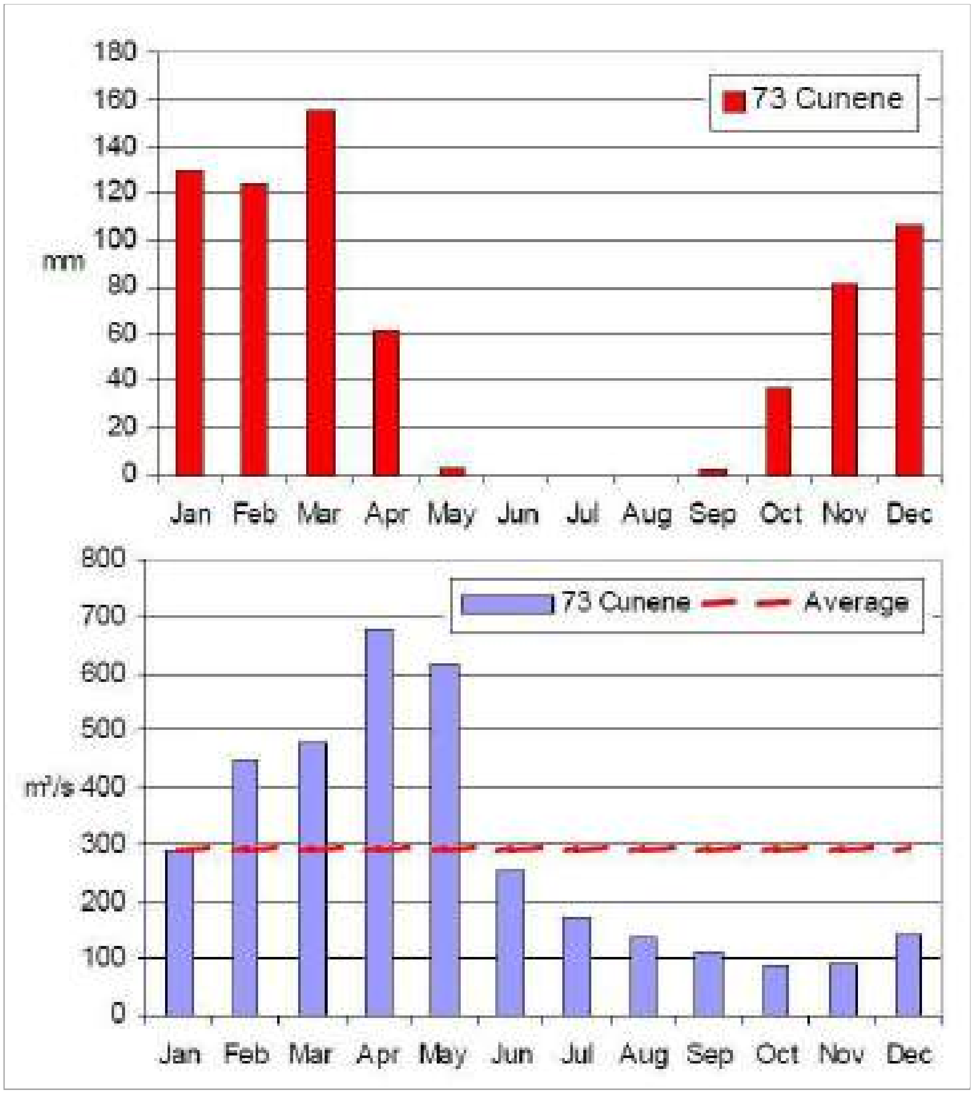


Figure 5.37: Seasonal evolution of precipitation and runoff in the Cunene River basin

In a more localised water analysis (Figure 5.36), the following situations stand out (from north to south):

- Between the starting point of the transmission line, north-east of Lubango (approximate co-ordinates 13,704 / -14,786) and the co-ordinate point 14,195 / -15,217 (near Mulonga), the drainage flow is southwards, comprising small tributaries on the left bank of the Caculuvar River in the IAI. The Ngoto River has the largest drainage area upstream of the powerline layout, with about 160 km^2 of drainage basin.
- Between co-ordinate point 14,195 / -15,217 (near Mulonga) and co-ordinate point 14,224 / -15,714 (Munguandjo), the drainage flows to the east. The waterlines in this area are tributaries of the right bank of the Mucope River and have small drained basins. The project corridor almost consistently coincides with an important ridge line.
- Between co-ordinate point 14,224 / -15,714 (Munguandjo) and co-ordinate point 14,311 / -16,295 (at the crossing of the Caculuvar River), tributaries of the left bank of the Caculuvar River are intersected. The drainage flows to the south and south-east. The Liambindje

River has the largest drainage area upstream of the powerline layout, with about 210 km^2 of drainage basin. In this basin a significant set of small lagoons occur.

- Between the crossing point of the Caculuvar River and co-ordinate point 14,328 /-16,489 (Calovango), the drainage runs towards the right bank of the Caculuvar River, in an east-northeast direction. The Calovango River has the largest drainage area upstream of the powerline layout, with about 490 km^2 of drainage basin.
- Between co-ordinate point 14,328 / -16,489 (Calovango) and the crossing point of the Cunene River (14,243 / -17,360), are tributaries of the right bank of the Cunene River. The Tchipa River basin has the largest drainage area upstream of the project layout, approximately 710 km^2.
- For about 4 km between the Cunene River and the Namibian border there is no watercourse crossing.

During the field surveys conducted in April 2019, several noteworthy watercourses within the study area were visited. Figure 5.36 indicates the locations of these, and the photographic records are presented in Figure 5.38. The heterogeneity of the watercourses was confirmed, in terms of flow rates, with no cases of extreme flow situations. This diversity has multiple causes, which highlights the varying drained areas, the varying lithologies of the draining basins and the different values of average annual precipitation.

Surface water is used for a variety of purposes, in particular for washing and watering animal stock. Occasionally, surface water is still consumed by the local people.

Figure 5.38: Watercourses within the study area, inspected April 2019

5.2.3.3 Hydrogeology

In geological terms, the project corridor overlaps with igneous (granite, anorthosite, gabbro, granitic porphyry), metamorphic (quartzite, mycaceous, schist, gneiss) and sedimentary (sandstone, conglomerate, sand, gravel, clay) formations, with a very diversified hydrogeological potential.

The characterisation of the groundwater resources of the study area was based on different sources of information from various places and with a varying degree of detail.

Hydrogeology of the Cunene River basin

According to DNA (2005), the average values of the productivity of aquifers within the study area, are presented in Table 5.10.

Table 5.10: Average productivity of aquifers

Geological unit and location	Average productivity (litres/s)
Precambric Schist Quartz (NW of the basin)	3
Precambrian gabbroic rocks (east of the basin)	3
Granites and Gneisses (NE of Lubango)	≤ 1
Sedimentary and volcanic rocks of the Pan African orogeny (south and west of Lubango)	3 – 6 (highest productivity in volcanic rocks)
Kalahari Tertiary and Quaternary Sediments	Unknown

In this same document, reference is made to the “high potential for groundwater production” of several fractured rocks of the Cunene basin, but this is limited by the annual rainfall, particularly in the southernmost part of the watershed. In the western part, the use of groundwater is limited due to its “high mineral content”.

Hydrogeological Atlas of Africa

The Hydrogeological Atlas of Africa is a document produced by the British Geological Survey (BGS) in collaboration with other entities and/or practitioners under the research program “Unlocking the Potential of Groundwater for the Poor” (UPGro). According to this source, the project corridor overlaps precambric metasediments (predominantly fractured groundwater flow and medium to high aquifer productivity) and the Kalahari Group sedimentary rocks (groundwater flow), predominantly intergranular and medium to high aquifer yields (Figure 5.39).

The Hydrogeological Atlas of Africa classifies an aquifer as having moderate productivity when, on average, the extractions are between 2 and 5 L/s, and as having high productivity when average extractions are between 5 and 20 L/s.

According to the “Atlas Groundwater Portal”, the project corridor overlaps distinct regions in terms of groundwater storage capacity, with the largest storage areas corresponding to the Kalahari sedimentary formations. For aquifer yields, the project corridor alternately traverses regions where groundwater abstractions can provide flow rates between 0.5 and 1 L/s, and regions where abstractions provide flow rates between 5 and 20 L/s. The geographical distribution of these regions is shown in Figure 5.40.

Furthermore, according to the same source of information, and with regard to the depth of the water table, between the starting point of the project layout (near Lubango) and the geographical co-ordinate point 14,374 / -16,716 (datum WGS84), the water level varies between 0-7 m and 25-50 m. From this last point to the border with Namibia, the predominant water table is between 50 and 100 m deep.

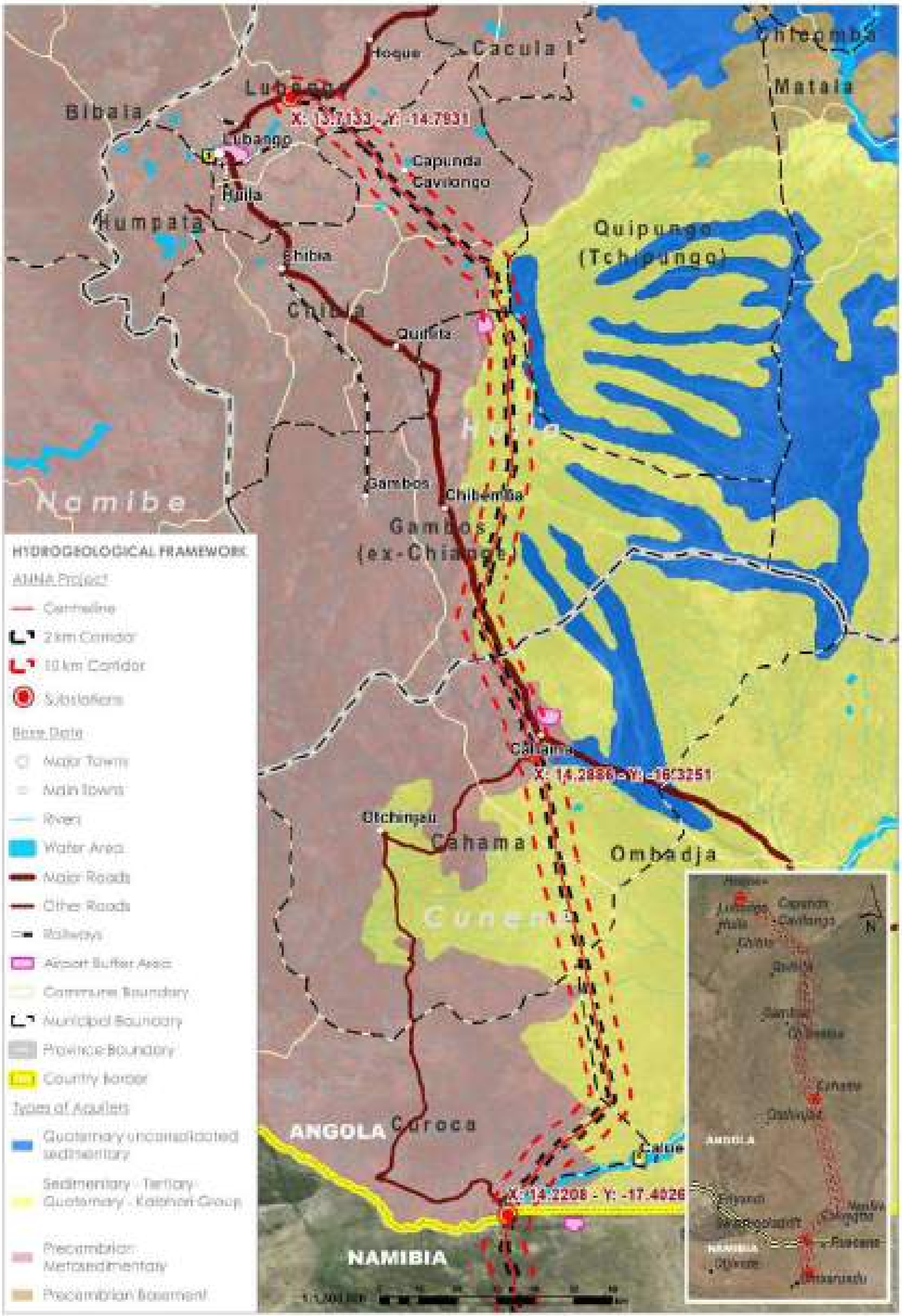


Figure 5.39: Regional hydrogeological framework

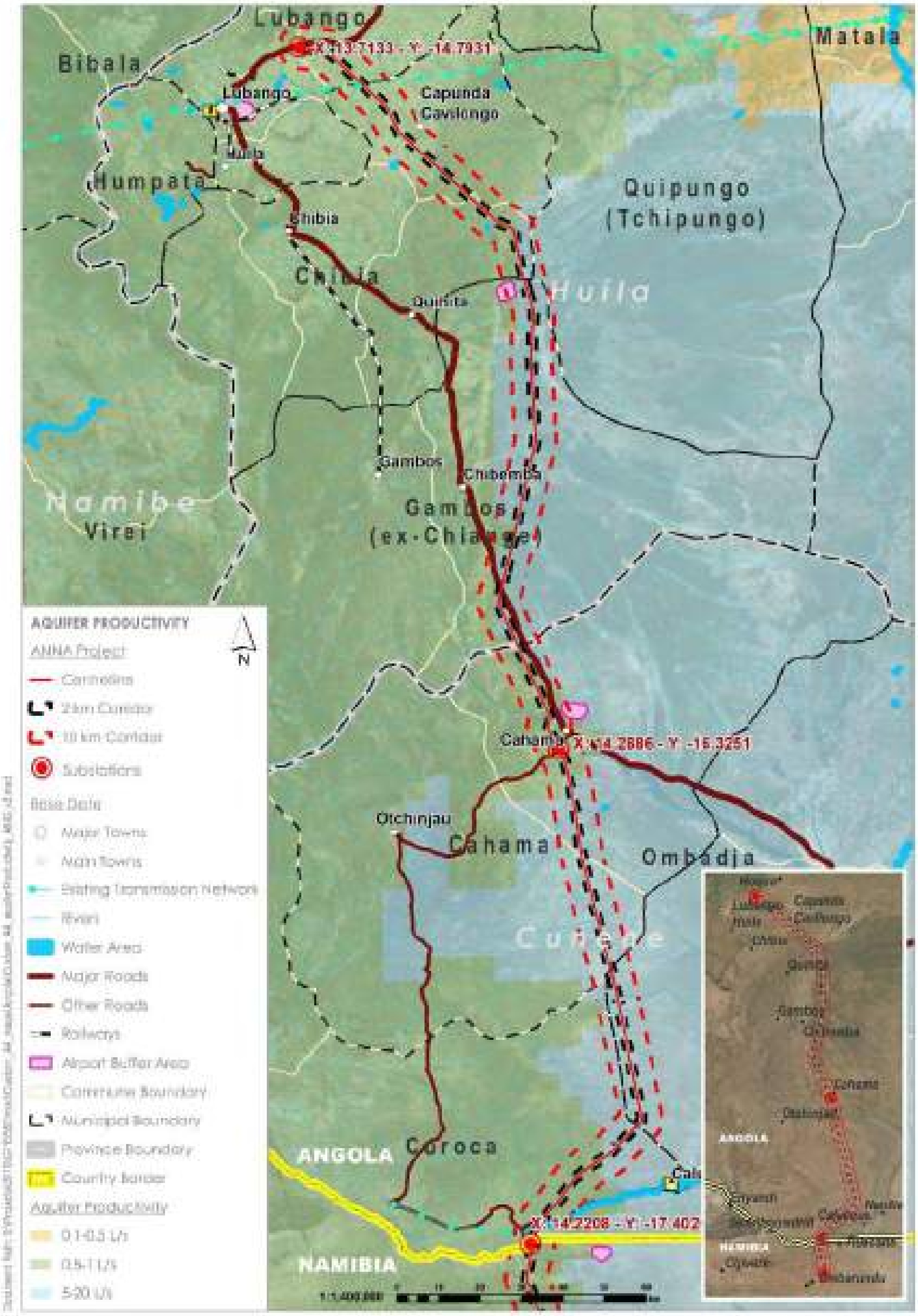


Figure 5.40: Regional aquifer productivity

The project area does not overlap with any transboundary aquifers (Figure 5.41). The nearest transboundary aquifers correspond to the “Cuvelai and Ethosa Basin / Ohangwena Aquifer System” (east of Ondjiva) and the “Coastal Sedimentary Basin IV” (near the mouth of the Cunene River).

Figure 5.41:Transboundary aquifers closest to the project corridor

Within the limits of the study area, several groundwater points were identified, predominantly vertical holes and wells (Figure 5.42). With regards to piezometric levels, characteristic values and temporal evolution (seasonal and interannual) are unknown. Similarly, no flow values are available for wells and/or vertical holes.

Figure 5.42: Various methods of groundwater abstraction within the study area

5.2.3.4 Water quality

The water quality regulations, which contain the national water quality standards, were published in Presidential Decree no. 261/11 of 6 October. This document establishes the rules and criteria for water quality, with the purpose of protecting the aquatic environment and improving the quality of water, according to its main uses. The provisions of the Decree apply to inland water, both surface and ground, for aquaculture, livestock, agricultural irrigation, and human consumption and bathing. The present law also regulates the standards for the control of wastewater discharge into national aquatic bodies and into the soil, with a view to preserving the quality of the aquatic environment and protecting public health.

The quality parameters that are included in this document are defined by Maximum Allowed Values (MAV), which indicate the quality standard values that should not be exceeded, Maximum Recommended Values (MRV), which indicate the quality standard values that must be met or not exceeded, and Emission Limit Values (ELV) that indicate the concentration value of certain substances that may not be exceeded when discharged into the aquatic environment and soil.

The drinking water quality standards are set out in Annex I and the minimum quality standards for surface water are set out in Annex IX. Wastewater discharge into the aquatic environment is generally regulated in Annex VI of Presidential Decree no. 261/11 of 6 October.

The quality objectives of the discharge of treated effluents are shown in Table 5.11.

Table 5.11: Quality objectives after primary treatment of effluent

Parameter	Values before treatment	Values after primary treatment
Total suspend soils (TSS)	300 mg/L	200 mg/L
BOD_5	300 mg/L	100 mg/L
pH	6 - 9	7 – 9
Total Coliforms	10^8 – 10^{10} CFU/100mL	0 MPN
Fecal Coliforms	10^6 – 10^8 CFU/100mL	0 MPN
Total Nitrogen	50 mg/L	50 mg/L
Total Phosphor	15 mg/L	15 mg/L

BOD_5 – Biochemical Oxygen Demand; CFU – Colony Forming Units; MPN-Maximum Probable Number

Sources of pollution (existing and potential)

The project corridor is located in a sparsely-populated region of Angola, intersecting a single population agglomerate of a significant size, namely Cahama. Not many, nor concentrated, sources of surface and/or groundwater pollution occur within the study area. Nevertheless, some activities and infrastructure have been identified as potential hotspots of contamination (Figure 5.43), with the following most noteworthy:

- Agricultural activity/developments in the alluvial lowlands of several rivers;
- Livestock;
- Extractive industry (quarries);
- Domestic washing in watercourses;
- Roads; and
- Aerodromes (in use or abandoned).

Climate change impacts, such as increasing temperature, increased evaporation and variable rainfall with a shorter more intense season, with an increased risk of flash floods, could result in reduced recharge of groundwater levels, with a possible change in water quality (for example salination). These climate change effects could also result in a decrease in water availability and possibly an increase in competition for water from different users, although the area is sparsely populated. Surface water and groundwater resources support biodiversity, and have the ability to assimilate pollution, including those which may be generated during construction of the project, such as concrete, herbicides and hydrocarbons, that enter the environment through accidental spills.

Figure 5.43: Examples of water pollution incidents

5.2.4 Soils and land use capability

5.2.4.1 Sources of information

For the characterisation of the soils and land use capability, the following information sources were consulted:

- Soil Atlas of Africa (Jones *et al*., 2013)
- World Soil Information Databases (https://www.isric.org/)

5.2.4.2 Soils in the study area

According to the Soil Atlas of Africa (Figure 5.44), the study area crosses the following soil types (from north to south):

- Haplos ferralsols (FRha) - strongly altered soils with reduced nutrient levels, showing no other differentiating characteristics;
- Xantho ferrasols (FRxa) - strongly altered soils with reduced levels of yellowish nutrients;
- Ferralic arenosols (ARfl) - strongly altered sandy soils with high iron content;

- Luvic Calcisols (CLlv) - soils with significant calcium carbonate accumulation, rich in clay mineral horizon;
- Calcium Vertisols (VRcc) - Soils with expansive clays and with calcium carbonate accumulation; and
- Litic Leptosols (LPli) - Shallow soil on hard rock.

From north to south, and to the Namibian border, the approximate ranges of allocation by soil type are as shown in Table 5.12, with values provided in linear kilometres.

Table 5.12: Approximate project extension by soil type [km]

FRha	FRxa	ARfl	CLlv	ARfl	VRcc	ARfl	LPli
68.5	12.5	80.0	4.0	12.5	21.0	105.7	21.0

Furthermore, according to the same source of information, a SWOT analysis (strengths, weaknesses, opportunities, threats) was undertaken for the types of soils affected by this project (Table 5.14).

From the “World Soil Information” database, information was obtained on nine georeferenced soil samples. The mapping of this information is shown in Figure 5.44 and the characteristics of the soils are described in Table 5.13 below.

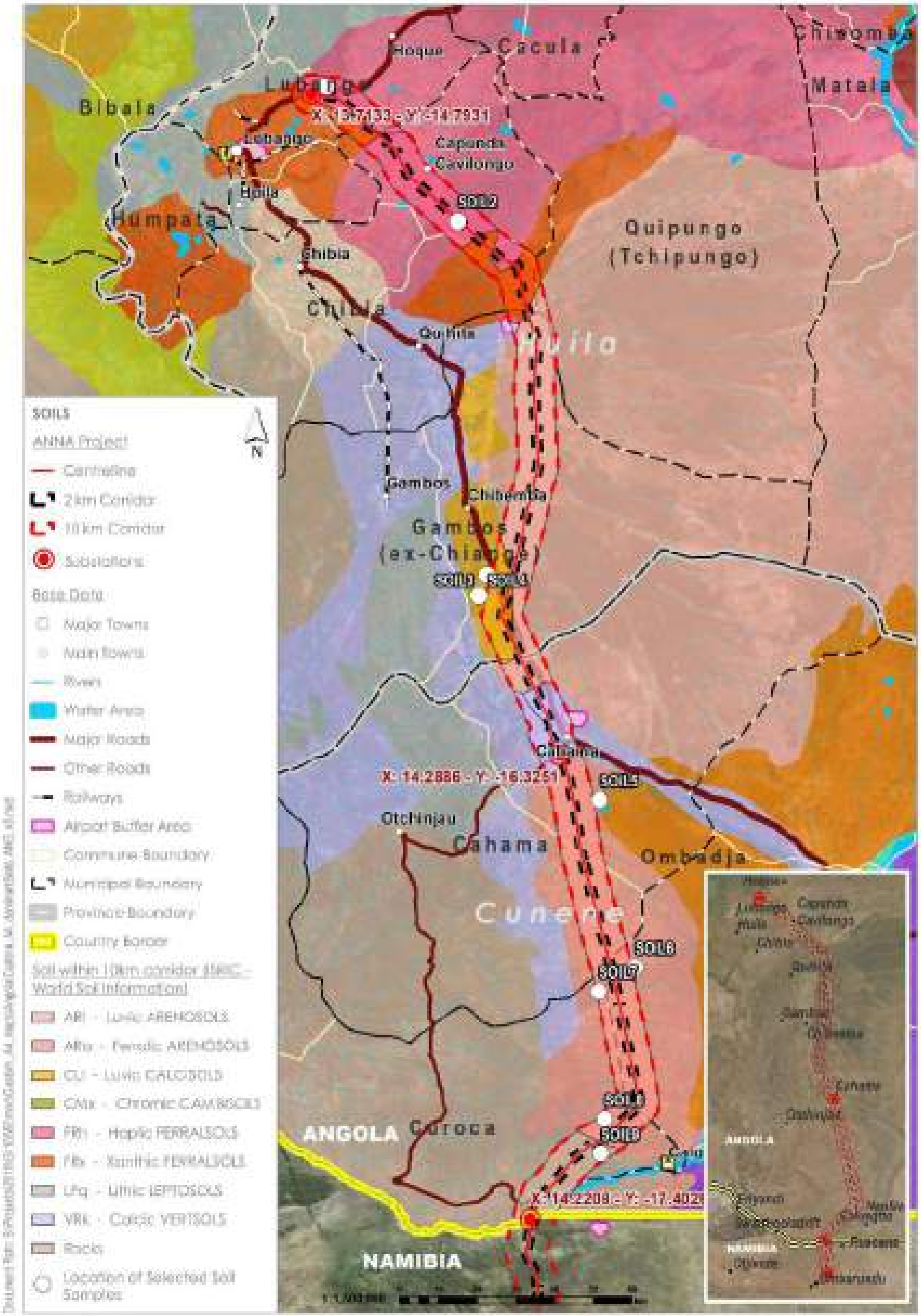
Table 5.13: “World Soil Information” database - characteristics of the study area

REF ESIA	Original reference	Information Available
SOL1	AO 30_P384/55	Observed in 1955 by E. P. Cardoso Franco. Observation depth of 128 (cm?). Local classification: Poorly Yellow or Orange Ferrals.
SOL2	AO 30_P196/54	Observed in 1954 by R. Pinto Ricardo. Observation depth of 125 (cm?). Local classification: Poorly Yellow or Orange Ferrals.
SOL3	AO 30_P113/54	Observed in 1954 by E. P. Cardoso Franco. Observation depth of 25 (cm?). Local classification: Semi-arid reddish brown.
SOL4	AO SOTER_P.111/54	Observed in 1954 by E. P. Cardoso Franco. Depth of observation 90 (cm?). Soil classified as endoleptic-chromic cambisol. FAO Classification (1988): CMx. Local classification: Semi-arid reddish brown.
SOL5	AO 30_P60/54	Observed in 1954 by R. Pinto Ricardo. Observation depth of 115 (cm?). Local classification: Compact semi-arid reddish-brown.
SOL6	AO SOTER_P.77/54	Observed in 1954 by E. P. Cardoso Franco. Observation depth of 105 (cm?). Soil classified as calcium luvysole. FAO Classification (1988): LVk. Local classification: Compact semi-arid reddish-brown.
SOL7	AO 30_P76/54	Observed in 1954 by R. Pinto Ricardo. Observation depth of 75 (cm?). Local Classification: Compact semi-arid grays.
SOL8	AO 30_P81/54	Observed in 1954 by E. P. Cardoso Franco. Observation depth of 100 (cm?). Local classification: Black clay (gravinigra).
SOL9	AO 30_P82/54	(no associated information)

Table 5.14: Weaknesses of, and threats to, soil types in the study area

Type of soil	Strengths	Weaknesses	Opportunities	Threats
Ferralsols	Sustain natural vegetation – commonly under tropical rainforest. Can sustain limited cultivation with addition of lime and fertilisers.	Ferralsols require specific soil management. As both inherent nutrient levels and nutrient retention are low to very low, soil amendments have to be given in small portions. Some Ferralsols are so strongly weathered that they no longer retain nutrients. The strong micro-aggregation leads to loose packing of the aggregates and the dominance of large pores. Consequently, most Ferralsols have a low water-retention capacity. During significant dry spells, supplementary irrigation may be needed to prevent drought stress.	Although most Ferralsols are acidic and have a high aluminium saturation, actual amounts of exchangeable aluminium are low and can easily be corrected by liming. However, the high iron content results in the fixation of phosphorus from fertilisers.	Maintaining soil fertility and prevention of surface soil erosion are important management requirements
Arenosols	Sandy soils are easy to work and therefore much sought after by farmers.	They only hold a small amount of organic matter, nutrients and water. Crops have to be irrigated frequently to provide the necessary moisture.	As Arenosols occur mainly in the drier parts of the continent, land use is normally limited to extensive (nomadic) grazing.	Without good soil conservation measures, Arenosols are prone to wind erosion. Wind breaks are essential in conserving the soil, which can easily be transformed into shifting sands and dunes.
Calcisols	Cultivation can often be successful with irrigation.	High pH unsuitable for many crops. Fertilisation with nitrogen, phosphorus and trace elements like iron and zinc may be necessary as these are only available naturally in small amounts.	In the Mediterranean region, extensive areas are used for the production of irrigated winter wheat, melons and cotton.	Lack of vegetation makes them prone to wind and water erosion. Crusts can easily develop.
Leptosols	They provide a solid foundation for construction.	Leptosols are unsuitable for growing crops. They have a limited rooting depth, a low water-holding capacity and their nutrient supply is confined to what is available in the shallow top layer.	Farmers use Leptosol areas only for grazing of their cattle.	Erosion
Vertisols	Vertisols can be productive, provided the right measures are taken.	As most Vertisols occur in level areas, water movement in the soil is limited and, during wet periods, water can stagnate on the surface. Heavy to work when wet. Swelling and shrinkage may destroy the foundation of structures (e.g. roads, irrigation canals).	Raised beds made out of the surface layer, which is often crumbly, are good seed beds, as the water drains quickly into adjacent furrows.	Can be susceptible to drought.

Source: Soil Atlas of Africa



Sources: Soil Atlas of Africa Map #20; "World Soil Information" databases

Figure 5.44: Soils that occur in the study area

Figure 5.45: Examples of Arenosol soils in the study area

5.2.4.3 Land cover and land use

The land use assessment is mainly based on available information on land cover for the region (GlobCover 2009), complemented by photo-interpretation of LiDAR and satellite images and subsequent validation during the field work undertaken in April 2019. The term “land cover” can be used to describe the vegetation covering the surface of the planet (which can also be bare ground or unvegetated). Land use of a certain region refers to the way in which this area is used/occupied by the community, i.e. a land cover of mixed shrubs and grass could be a park, an orchard or, in an African context, savannah/grazing land (Soil Atlas of Africa, 2013).

The land cover information within the DAI is presented in Figure 5.46, Figure 5.47 and Figure 5.48, and is summarised in Table 5.15 and in Table 5.16, divided per municipal and communal administration. The most representative land cover units are the Closed to open Grassland (140), that occupies 35% of the study area (DAI), followed by the Mosaic Vegetation/Croplands (30), representing 21%, the Open Broadleaved Deciduous Forest (60) with 21%, and finally the Closed to open Shrubland (130) with 14%. The remainder of the land cover units represent 10% of the total and, as such, have very little representation in the area.

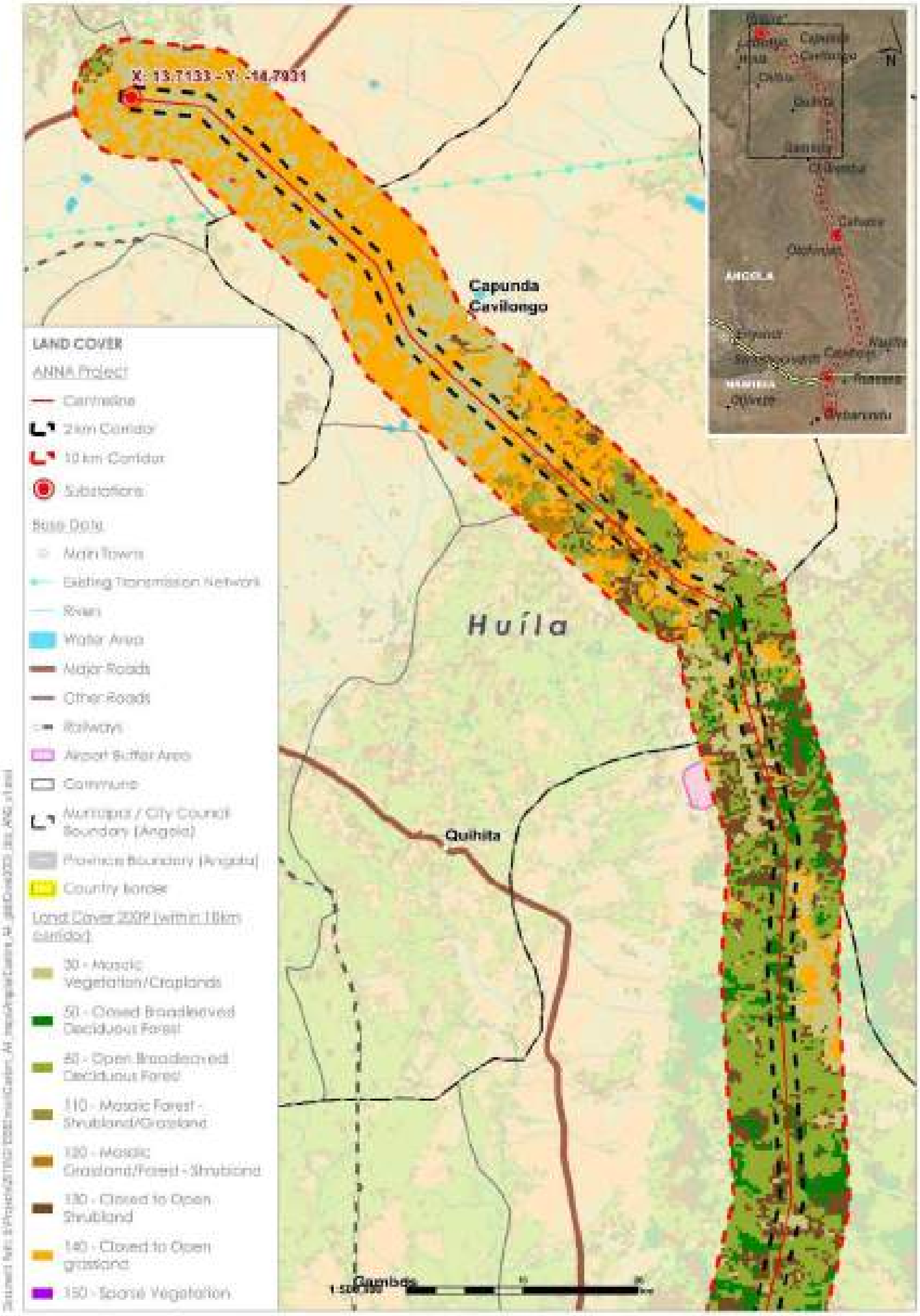


Figure 5.46: Land cover within the IAI (Lubango to Gambos)

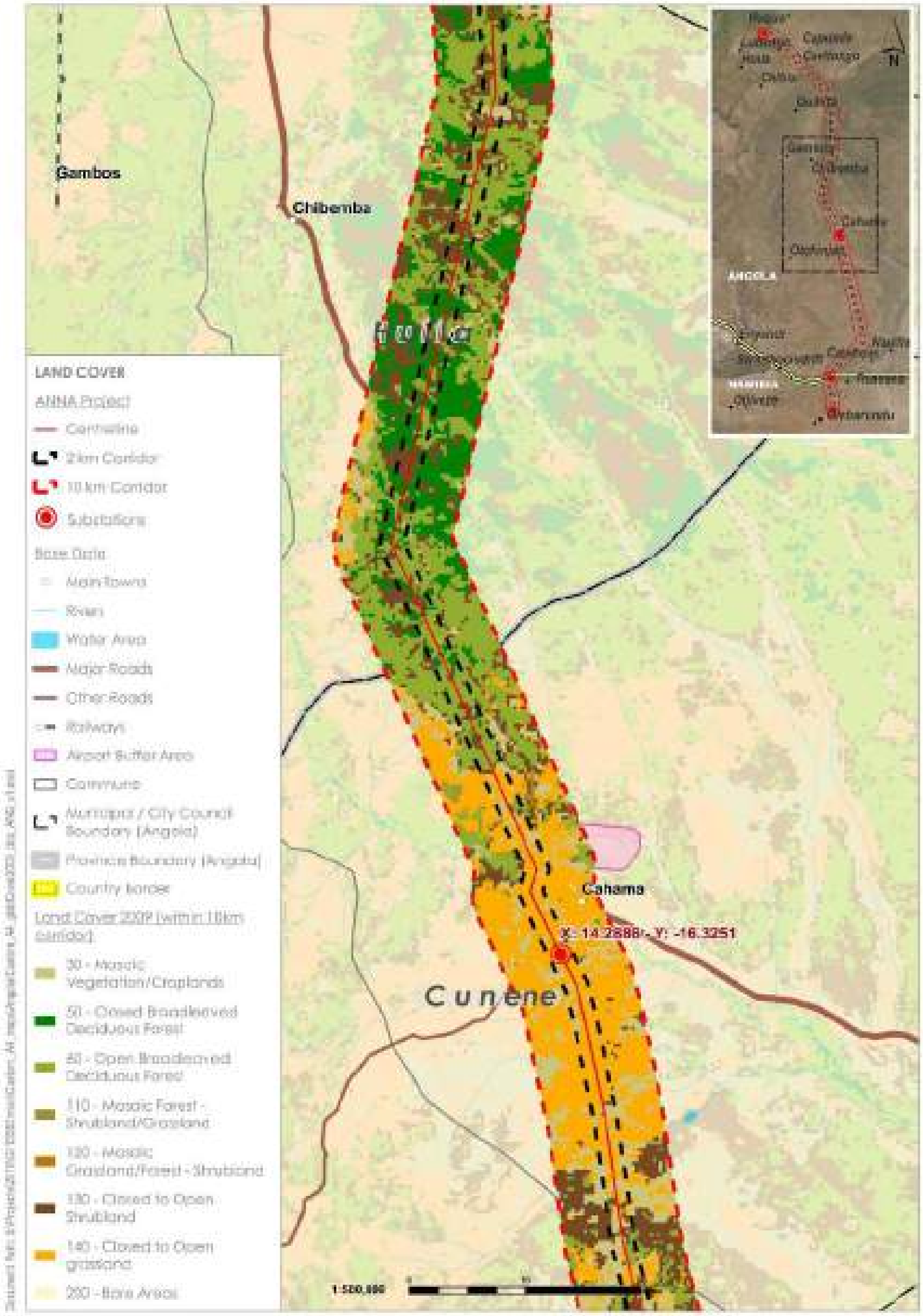


Figure 5.47: Land cover within the IAI (Gambos to Cahama)

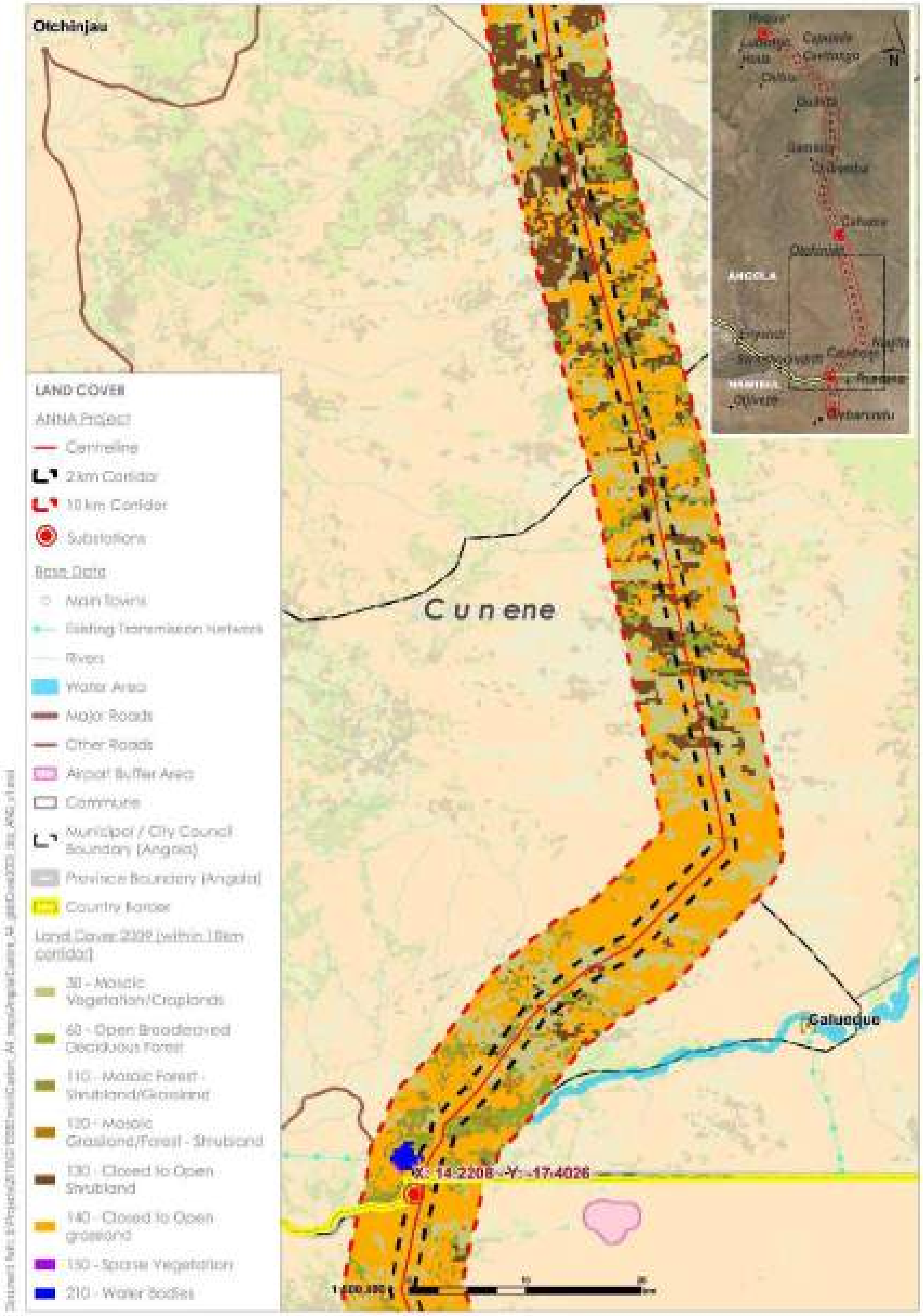


Figure 5.48: Land cover within the IAI (Otchinjau to Namibia)

Table 5.15: Land cover units within the DAI

Land cover unit	Total (ha)	%
30 - Mosaic Vegetation/Croplands	13718,4	21
50 - Closed Broadleaved Deciduous Forest	4521,0	7
60 - Open Broadleaved Deciduous Forest	13321,0	20
110 - Mosaic Forest - Shrubland/Grassland	1376,0	2
120 - Mosaic Grassland/Forest - Shrubland	1019,5	2
130 - Closed to open Shrubland	9263,4	14
140 - Close to open Grassland	22946,3	35
210 - Water Bodies	38,7	0
Total	**66204,4**	**100**

Table 5.16: Land cover units per community, within the DAI

Municipality	Community	Land cover unit	Total (ha)
Lubango	Hoque	120 - Mosaic Grassland/Forest - Shrubland	18,4
		130 - Closed to open Shrubland	27,5
		140 - Close to open Grassland	1 892,7
		30 - Mosaic Vegetation/Croplands	1 883,8
	Hoque Total		**3 822,3**
Lubango Total			**3 822,3**
Chibia	Kapunda Kavilongo	110 - Mosaic Forest - Shrubland/Grassland	362,5
		120 - Mosaic Grassland/Forest - Shrubland	333,6
		130 - Closed to open Shrubland	36,5
		140 - Close to open Grassland	3 755,9
		30 - Mosaic Vegetation/Croplands	2 887,5
		60 - Open Broadleaved Deciduous Forest	305,8
	Kapunda Kavilongo Total		**7 681,7**
	Kihita	110 - Mosaic Forest - Shrubland/Grassland	184,5
		120 - Mosaic Grassland/Forest - Shrubland	537,5
		130 - Closed to open Shrubland	921,7
		140 - Close to open Grassland	993,9
		30 - Mosaic Vegetation/Croplands	995,6
		50 - Closed Broadleaved Deciduous Forest	418,6
		60 - Open Broadleaved Deciduous Forest	940,3
	Kihita Total		**4 992,1**
Chibia Total			**12 673,8**
Gambos (ex-Chiange)	Chimbemba	130 - Closed to open Shrubland	4 551,7
		140 - Close to open Grassland	86,5
		30 - Mosaic Vegetation/Croplands	682,0
		50 - Closed Broadleaved Deciduous Forest	3 998,3
		60 - Open Broadleaved Deciduous Forest	8 848,5
	Chimbemba Total		18 167,1
Gambos (ex-Chiange) Total			18 167,1
Cahama	Kahama	110 - Mosaic Forest - Shrubland/Grassland	77,5
		130 - Closed to open Shrubland	777,7
		140 - Close to open Grassland	6 076,2
		30 - Mosaic Vegetation/Croplands	1 854,2
		50 - Closed Broadleaved Deciduous Forest	104,1
		60 - Open Broadleaved Deciduous Forest	1 805,8
	Kahama Total		**10 695,4**
	Otchinjau	110 - Mosaic Forest - Shrubland/Grassland	69,7
		120 - Mosaic Grassland/Forest - Shrubland	31,8

Municipality	Community	Land cover unit	Total (ha)
		130 - Closed to open Shrubland	1 360,8
		140 - Close to open Grassland	2 630,2
		30 - Mosaic Vegetation/Croplands	922,9
		60 - Open Broadleaved Deciduous Forest	684,9
	Otchinjau Total		**5 700,2**
Cahama Total			**16 395,6**
Curoca	Chitado	110 - Mosaic Forest - Shrubland/Grassland	525,7
		120 - Mosaic Grassland/Forest - Shrubland	27,2
		130 - Closed to open Shrubland	201,7
		140 - Close to open Grassland	3 985,8
		30 - Mosaic Vegetation/Croplands	1 668,9
		60 - Open Broadleaved Deciduous Forest	280,9
	Chitado Total		6 690,2
Curoca Total			**6 690,2**
Ombadja	Humbe	110 - Mosaic Forest - Shrubland/Grassland	88,4
		120 - Mosaic Grassland/Forest - Shrubland	62,1
		130 - Closed to open Shrubland	1 385,8
		140 - Close to open Grassland	2 965,8
		30 - Mosaic Vegetation/Croplands	2 823,6
		60 - Open Broadleaved Deciduous Forest	431,4
	Humbe Total		**7 757,1**
	Naulila	110 - Mosaic Forest - Shrubland/Grassland	67,7
		120 - Mosaic Grassland/Forest - Shrubland	9,1
		140 - Close to open Grassland	559,3
		210 - Water Bodies	38,7
		60 - Open Broadleaved Deciduous Forest	23,5
	Naulila Total		**698,3**
Ombadja Total			**8 455,4**
Grand Total			**66 204,4**

The field investigation confirmed the existence of a “mosaic” of large patches of homogeneous land occupation, which influence different forms of land appropriation and exploitation. These mosaics provide the DAI with an essentially rural character.

The mosaic of forests assumes greater representation in the middle of the corridor. The tree layer varies in composition, size and density, depending on the soil characteristics: miombo (*Brachystegia*), dominant in the central DAI sector, replaced towards the south with formations of mopane (*Colophospermum mopane*). When water is scarcer, these species give way to savannah-like shrubby plant formations, that appear sparsely or in dense clusters (sometimes difficult to penetrate). Inselbergs (granite rocky hills that emerge sharply from the surrounding plain) occur, occasionally, between Lubango and Cahama.

The only existing urban settlements in the DAI are the village of Capunda Cavilongo (part of the secondary urban network, located in the northern sector) and the village of Cahama (of the primary urban network, located in the central sector). In these villages there are two types of areas:

- **Urban area** (urban centre) - consolidated built space, especially with conventional dwellings, arranged in an organised grid and structured in blocks.
- **Peri-urban area** (peripheral area, which may be referred to as suburbs) - where settlement develops in a disorganised or unplanned way, constituting an unstructured urban network.

5.2.5 Air quality

Currently there is no data available from air quality measurements in the study area, not for the Huíla Province, nor for the Cunene Province. As such, the assessment made in this section is of a qualitative nature and is based on the information collected during field work. The air quality in the wider area of the corridor is predominantly determined by several driving forces that influence the characteristics of the emissions in a particular area, mainly related to land use and occupation activities.

In the urban areas of Angola, the main sources of air pollutants are related to traffic, industrial plants/installations, infrastructure such as airports, and diesel generators to produce electricity when the national electricity grid fails. Although exhaust gases and other harmful gaseous substances emitted by vehicles, machinery and equipment, form part of an important component of the air pollutants, dust from unpaved roads/tracks also contribute to local air emissions. This is the case in the city of Lubango, where the high concentration of population and associated infrastructure, industrial occupation and services, create the conditions for high peaks in air emission levels, particularly during peak traffic periods.

The towns included in the study area, namely Capiunda Cavilongo and Cahama, are predominantly rural and, as such, the expected main air pollutants are associated with traffic, diesel generators and dust emissions from unpaved roads. Although Cahama has an airport, the rural characteristics of the surrounding area, and the fact that this is a military aerodrome with a low level of air traffic, both contribute to a generally acceptable air quality status in this town.

In the rural areas, which are the majority of populated areas within the DAI, air quality is mainly affected by traffic, diesel generators (primarily in the municipal and community centres) and dust emissions from unpaved roads.

These emissions, although they can cause sporadic short-term events of air pollution, particularly concerning dust emissions from unpaved roads in dry weather, are not sufficiently intense to affect large areas and, as such, can be considered insignificant. In these rural areas the burning of coal and wood as fuel for small artisanal manufactures, such as brick and charcoal production, can also contribute to short-term and localised emissions of pollutants. In the areas around the granite quarries an increase in dust emissions is expected during the drier months of the year.

Common to all areas, urban and rural, is the burning of coal and wood as fuel in households for cooking and light at night, especially in families with lower incomes or removed from the main centres, hence with no access to electricity or other sources of energy. The emissions from these sources can also be considered of low significance within the context of the affected area.

5.2.6 Ambient noise

Similarly to what is stated for air quality (Section 5.2.4.3), there is no known data of ambient noise measurements in the study area, and the assessment in this section is therefore qualitative, based on information gathered during the field work. The ambient noise in the region is predominantly influenced by land use and occupation activities.

In the urban area of Lubango, the ambient noise is predominantly influenced by traffic, especially on the main roads where there the number of vehicles is high during the majority of the day. The other contributors to noise include: diesel generators, industrial sites (including offices, production plants, mechanical workshops and other small businesses), construction sites (scattered across the city), aircraft (from the airport) and locations hosting large gatherings of people (markets, public services/administrative buildings, churches, schools, hospitals, etc.).

For the rest of the study area, environmental noise is primarily influenced by traffic on main, and other, roads. On the tarred/paved roads, noise is created by heavy load traffic, such as the road that links Lubango to Cahama and then to Ondjiva (EN105), and on unsurfaced roads the noise is due to the poor conditions and irregular surface causing vehicles to labour harder. Some of the towns, and all of the rural areas, may be disturbed by sporadic and temporary sources of noise such as construction works, movement of heavy vehicles (e.g. transport of supplies or cattle), blasts and machinery from the quarries and from aircraft (mainly around the Cahama airport).

5.3 Biotic Environment

5.3.1 Methodology

5.3.1.1 Literature review

A comprehensive literature review, including "recent" relevant publications pertinent to the topic, was conducted between 13 and 15 April 2019, prior to the site investigations. This review included flora (larger trees/shrubs and grasses) and vertebrate fauna (amphibians, avifauna, mammals and reptiles) known, or expected to occur, in the general area between the proposed Lubango substation and the Cunene River, i.e. species associated with the general ANNA corridor project within these areas. The focus was on unique species, i.e. rare, threatened and endangered (R,T&E), protected and endemic species, etc., as determined by the international and Angolan legal status for such species.

5.3.1.2 Field survey

The specialist carried out a rapid site visit of the proposed affected area was conducted between 20 and 26 April 2019, i.e. between the proposed Lubango substation and the Cunene River, to familiarise himself with the local environment, as well as to conduct a rapid flora and habitat survey along this route. This was supplemented by viewing Google Earth maps and LiDAR images.

5.3.1.3 Flora and habitats

A rapid vegetation and habitat survey was conducted at various points along the abovementioned proposed section of the transmission line route. This was supplemented by a literature study of species (e.g. larger trees/shrubs (>1m in height) and grasses) potentially occurring throughout the general areas.

Trees and shrubs - Identified to species level, and dominant species recorded, with the focus on the larger protected species. Invasive alien species were also recorded when observed.

Grasses - Due to time constraints, grasses were limited to the literature study only.

Other - All other important species were identified whenever encountered (e.g. *Aloe* species) while other important species (e.g. ferns, lichens, etc.) were limited to the literature study only.

Habitats - A general overview of important habitats (e.g. granite outcrops, pans, rivers, etc. with a high and/or unique biodiversity) potentially affected, was conducted at the proposed Lubango and Cahama substation areas, and along the route surveyed.

5.3.1.4 Vertebrate fauna

The vertebrate fauna known and/or expected to occur along the study areas was based on a literature study.

5.3.2 Terrestrial ecology

5.3.2.1 Areas with importance for nature conservation

5.3.2.1.1 Biogeography, biomes and ecoregions

Angola's geographic location, geological history, climate and physiography account for its rich biological diversity. The comparative paucity of research focussed on, or within, Angola explains the dependence of descriptions of the country's biogeography on broader regional reviews.

Angola lies between, and within, two major terrestrial biogeographic regions: the moist forests and savannas of the Congolian region, and the woodlands, savannas and floodplains of the Zambezian region. These two major divisions occupy in excess of 97% of Angola. Gallery and escarpment forests of *Congolian affinity* penetrate southwards into the Zambezian savannas and woodlands of the Angolan planalto, along deeply-incised tributaries of the Congo Basin, and form a broken chain of forests southwards along the western escarpment. In the south, the extensive *Brachystegia/Julbernardia* miombo woodlands that occupy most of central Angola transition to *Baikiaea/Guibourtia/Burkea* savannas and woodlands. In the south-west, the arid *Acacia/Commiphora/Colophospermum* savannas, dwarf shrublands and desert of the Karoo-Namib region are found, penetrating northwards as a narrowing wedge along the coastal lowlands to Cabinda.

At the first level, the nine biomes of Africa are included in three main biogeographic divisions (Palearctic, Afrotropical and Cape). Of these nine biomes, seven are represented in Angola – the largest range of biomes represented in any African country. These are:

- Tropical and subtropical moist forests;
- Montane grasslands and shrublands;
- Tropical and subtropical grasslands, savannas, shrublands, and woodlands;
- Tropical and subtropical dry and broadleaf forests;
- Deserts and xeric shrublands;
- Mangroves; and
- Flooded grasslands and savannas.

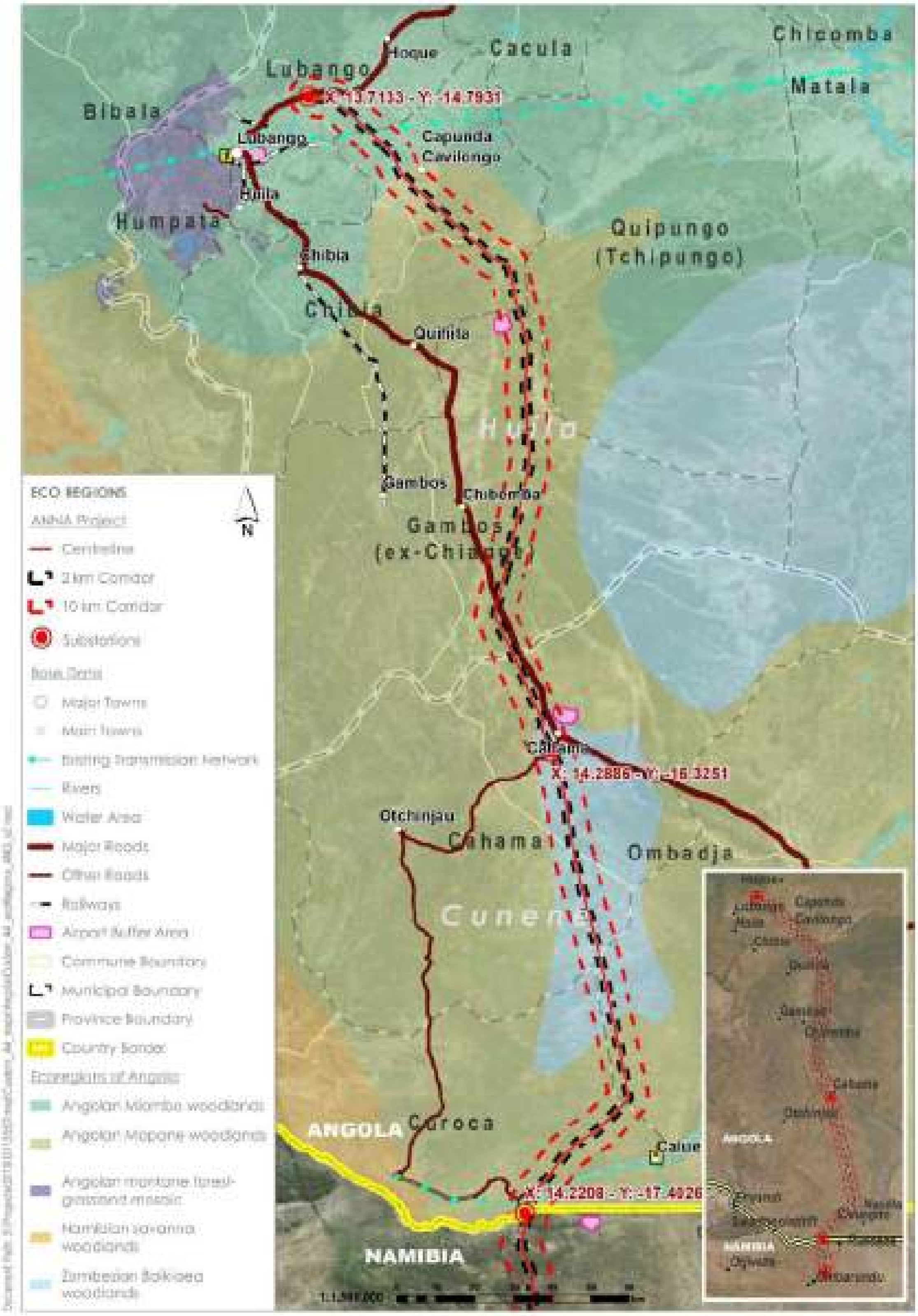
Within these biomes, Burgess et al. (2004)1 defined a total of 119 terrestrial ecoregions for Africa and its islands. Figure 5.49 provides a high-level framework of Angola's biodiversity patterns. The ANNA corridor crosses the Angolan miombo woodland, Zambezian *Baikiaea* woodland and Angolan mopane woodland.

The largest section of the corridor runs within the Angolan mopane woodlands ecoregion. The northern part of the corridor also runs through the Angolan miombo woodlands and there is a small stretch that passes through the Zambezian *Baikiaea* woodlands.

The Angolan mopane woodlands are situated in south-western Angola, extending into northern Namibia. The ecoregion includes the Cunene River, which divides the two countries, and is one of the main sources of water in this dry region. Mopane trees (*Colophospermum mopane*) dominate the vegetation and are an essential resource for both the people and the wildlife of the region. Elephants (*Loxodonta africana*) utilise almost every part of the mopane tree, and the region supports other large herbivores, including the critically-endangered black rhino (*Diceros bicornis*). Species richness in this ecoregion is high, especially in comparison with the arid deserts to the west.

The mopane in this ecoregion occurs either as a shrub or a tree, depending on local conditions. In some areas it forms a dense woodland, whereas in others it grows as a short shrub intermingled with scattered trees. In Angola, the mopane grows over vast areas in a low, thorny bushveld. It is associated with other trees such as *Acacia kirkii*, *A. nilotica* subsp. *subalata*, *A. hebeclada* subsp. *tristis, A. erubescens*, *Balanites angolensis*, *Combretum apiculatum*, *Commiphora* spp., *Dichanthium papillosum*, *Dichrostachys cinerea*, *Grewia villosa*, *Indigofera schimperi*, *Jatropha campestris*, *Melanthera marlothiana*, *Peltophorum africanum*, *Rhigozum brevispinosum*, *R. virgatum*, *Securinega virosa*, *Spirostachys africana*, *Terminalia prunoides*, *T. sericea*, *Ximenia americana*, and *X. caffra*. On alluvial soils *Acacia kirkii* becomes abundant.

1 In Huntley *et al*, 2019.



Source: https://www.worldwildlife.org/publications/terrestrial-ecoregions-of-the-world

Figure 5.49: Ecoregions of Angola

5.3.2.1.2 Protected Areas and nature conservation areas

There are four Angolan Protected Areas within the region where the ANNA transmission line corridor passes through (Figure 5.50):

- Bicuari (Bicuar in Portuguese) National Park;
- Mupa National Park;
- Iona National Park; and
- Namibe Partial Reserve.

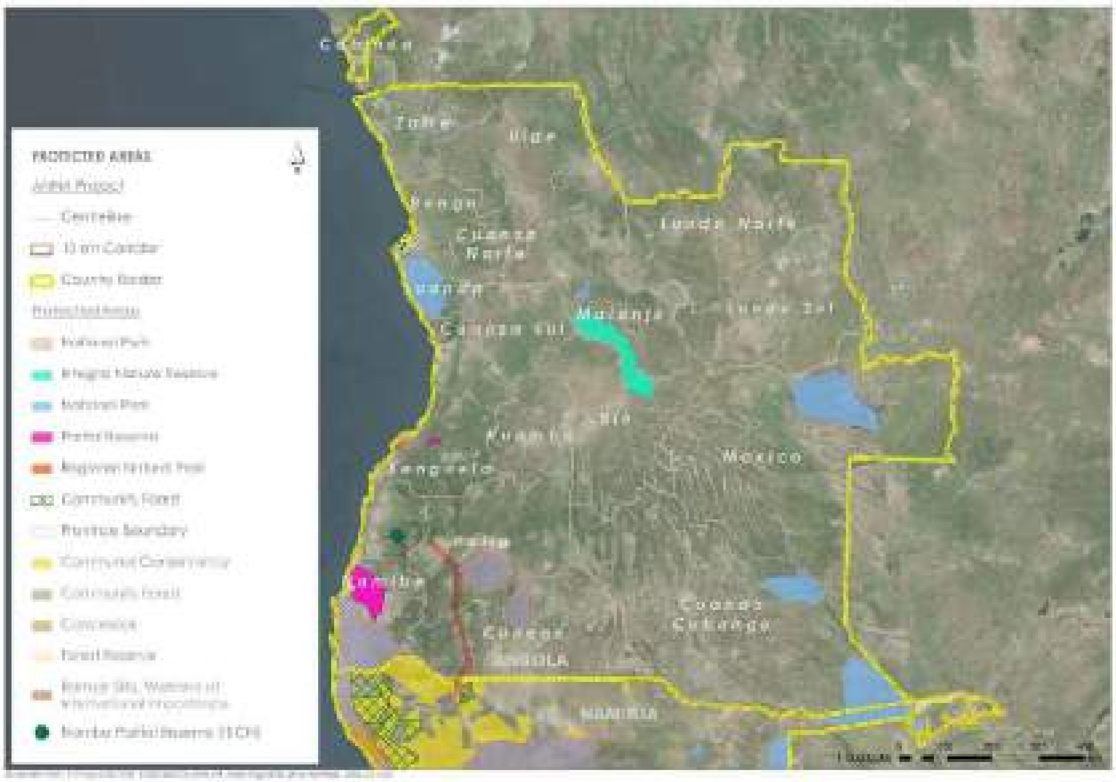


Figure 5.50: Protected Areas in Angola and Namibia

However, it is important to mention that there will be no direct impact on any Protected Area or important conservation area (Figure 5.50). The closest area to the DAI is the Bicuari National Park, which is, at its closest point, 500 m east of the transmission line corridor, as it is shown in Figure 5.51. The proposed route in the premises of the Bicuari National Park follows existing accesses and is located West to the settlements of Nampunda and Chimbolelo and associated agricultural fields.

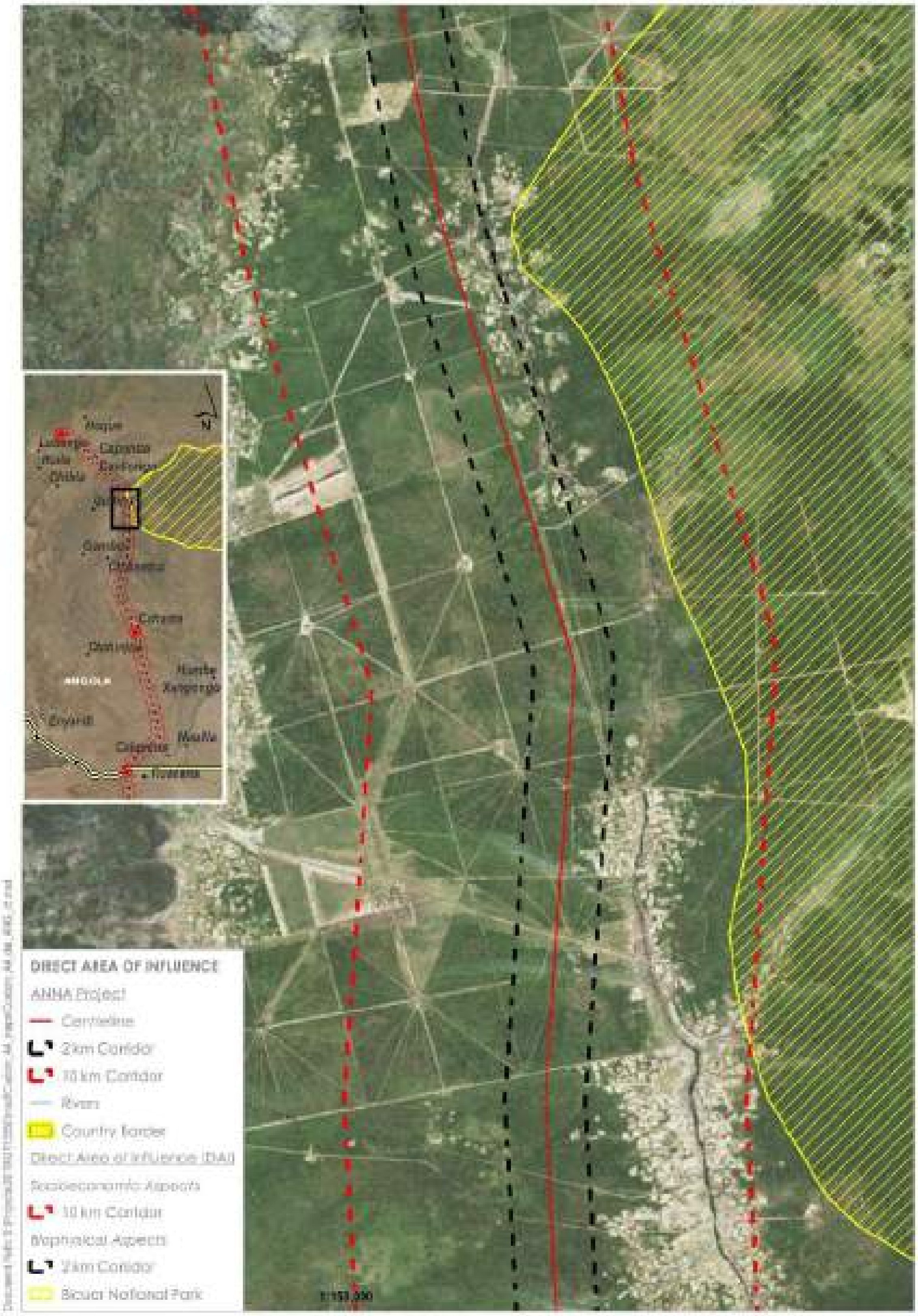


Figure 5.51: Detail of the ANNA corridor close to Bicuari National Park

Bicuari National Park was declared a Game Reserve, through Ordinance (Portaria) no. 2620 of 16 April 1938, and was elevated to National Park status by Legislative Diploma no. 3527 of 26 December 1964. This Park, located in the Huila Province, lies 165 km from Lubango city and has a total expanse of 790 000 ha. During the war period, the infrastructure of the Bicuari National Park was abandoned and, in 2007, rehabilitation work commenced. Nowadays this Park has four inspection posts, with facilities to enable management and administration of the Park. The town of Mulondo and the village of Tecaza are situated in the south-east corner of the Park, within its boundary.

Mean annual rainfall in the area exceeds 800 mm, and the topography is generally flat. Bicuar National Park is situated in the basin of the Mucope River (a tributary of the Cunene River), with its only natural boundary formed by the Osse River, another tributary of the Cunene river, with all other boundaries being manmade. Two important marshy zones are present, which are the drinking water locations for the animals.

The vegetation is a mosaic of miombo (*Brachystegia, Julbernardia*) and teak (*Baikiaea*) on sands, dry thickets and riverine woodland, with extensive patches of dry grassland. Poorly-drained grasslands edge the Mucope River.

Among the mammals present in the Park, the African buffalo (*Syncerus caffer caffer*) is the most iconic. The area has historically been known to support large herds of elephants (*Loxodonta africana*), antelopes, elands, gnus, zebras and other large mammals in fair numbers in the early 1970s (Huntley, 1974a). Other relevant mammals known to occur (Cabral, 1987; Cabral and Simões, 1988) include the brown hyaena (*Hyaena brunnea*) and lion (*Panthera leo*). All species populations were severely reduced during the war (as the Park was reportedly used as a practice artillery range) and by poaching and human encroachment.

The avifauna[1] of the Park is poorly known, with only six biome-restricted species being recorded. However, it is likely that it supports several more species of the Zambezian and Kalahari–Highveld biomes. This is one of the few reserves in Angola where miombo (Zambezian) bird species occur together with bird species more typical of the southern, dry, broadleaved woodlands (Kalahari–Highveld). For example, the distributions of *Lamprotornis mevesii* and *L. australis* extend north into the Park, and *Neocichla gutturalis*, which has a narrow, patchy distribution in Angola, is abundant within the miombo woodland in the Park. *Lanioturdus torquatus*, a Kalahari–Highveld species, is almost certain to occur in the woodland, as it has been recorded to the north, south and west of the Park.

Large raptors are common in the area, with *Necrosyrtes monachus*, *Torgos tracheliotus*, *Trigonoceps occipitalis*, *Terathopius ecaudatus* and *Aquila rapax* fairly commonly present at carcasses, and *A. wahlbergi* and *Lophaetus occipitalis* abundant in the woodland. No active nests of large raptors were recorded in September 2019, but several old nests were seen, and only *Merops hirundineus* was recorded as actively breeding. *Bucorvus cafer* are common in the open woodland and *Neotis denhami* is abundant in the dry grasslands.

Wetland habitats within the Park support at least 36 species of congregatory waterbird (25% of the Angolan list), some in numbers considered at least nationally important. In Angola, this is the only locality where *Oxyura maccoa* has been recorded (M. A. Huntley, pers. comm.) and the only locality where *Sarkidiornis melanotos* has been recorded breeding (Dean et al. 1988). Waders such as *Himantopus himantopus* occur on the margins of ponds in poorly-drained grassland. Although *Chlidonias hybridus* has not been recorded on this site, it has been observed in the general area and it is likely to breed on ponds along the Mucope River and on other seasonally-flooded ponds.

As threats to key biodiversity, the birdlife factsheet (2019) emphasises the fact that the Park is not fenced and that cattle (from adjacent agricultural settlements) were frequently found in the Park during the early 1970s (Huntley, 1974b). Poaching in the Park (primarily of elephants) escalated after independence in 1974 (Huntley, 1975). A study on the mammals present in Bicuar and Mupa National Parks recently released (Overton, 2017) states: "*The results of the investment into Bicuar restoration were evident in the*

1 Information collected from BirdLife International (2019) Important Bird Areas factsheet: Bicuari National Park. Downloaded from http://www.birdlife.org on 29/10/2019.

infrastructure and staff at Bicuar. Bicuar had a good foundation of infrastructure including buildings, roads and artificial water and well-trained and dedicated staff. Together this indicates a well-capitalized and well-managed park, with a good plan for restoration. This provides an excellent foundation for rebuilding wildlife populations and attracting tourism, but is dependent upon ongoing investment and protection. Habitats were mainly intact, although fire had a strong presence".

This study also includes management recommendations for the park, and it is stated that "*Bicuar would make an excellent candidate for a co-management relationship to help provide funds and other support to manage and protect the park*" (Overton, 2017).

5.3.2.2 Flora and habitats

As set out in Section 3.1, Angola has a set of legislation addressing the protection of living natural resources. The most important for the present assessment is Executive Decree no. 252/18 of 13 July, that approves the Red List of Species for Angola. The Red List comprises threatened plant and animal species and is determined by a set of quantitative criteria. With its strong scientific base, the Red List is recognised as the most authoritative guide to the status of biological diversity.

This decree recognises the importance of the International Convention on Trade in Endangered Species of Wild Fauna and Flora (CITES), the importance of maintaining and regenerating animal species, restoring damaged habitats, and controlling, in particular, the activities, or use of substances, likely to harm wildlife species and their habitats. It takes into account the provisions of the National Policy on Forests, Wildlife and Conservation Areas approved by Resolution no. 1/10 of 14 January, in conjunction with the Strategy and the National Action Plan for Biodiversity, approved by Resolution no. 42/06 of 26 July, recognises the particular attention that should be given to species considered endangered, vulnerable and invasive at national level, and recognises the importance of the obligations imposed by the Convention on Biological Diversity (CBD).

The decree contains a requirement to approve the Red List and to disclose the categories of species of Angola.

The Red List of species of Angola is composed of four categories, namely:

- Category A - Extinct Species (Ex): When the species has a history of natural occurrence in Angola and is considered extinct or has never been seen in its habitat;
- Category B - Extinction Species (AEx): When several factors seriously threaten a species' existence, making it difficult to reproduce or regenerate in the wild, bringing populations below sustainable levels;
- Category C - Vulnerable Species (Vul): When human activity threatens a species' existence naturally within the national territory; and
- Category D - Invasive Species: When the species does not occur naturally or is introduced into the national territory.

The category of each species is updated by means of scientific information available over a period of five years.

5.3.2.2.1 Tree and shrub diversity

As previously mentioned, almost the entire territory of Angola is included in the Zambezian domain of the Sudan-Zambezian geo-botanic region (Beernaert, 1997). Angola is botanically rich and floristically diverse with approximately 32 vegetation types (Barbosa, 1970) and 6 850 indigenous plant species, of which 14.8% are viewed as endemic. Furthermore, an additional 230 naturalised species have been recorded, four of which are regarded as highly invasive (Goyder and Gonçalves, 2019). Legumes (934 spp.), grasses (526 spp.), *Compositae* (463 spp.) and *Rubiaceae* (444 spp.) are the most diverse families in the Angolan floral kingdom, and *Crotalaria* and *Euphorbia* each have more than 40 Angolan endemic species (Goyder and Gonçalves, 2019).

The western Angolan highlands (e.g. Lubango area) are viewed as a distinct floristic bioregion, currently with 200 endemic species, although also the least well-documented stretch of the Great Escarpment of southern Africa (Goyder and Gonçalves, 2019).

Huntley and Matos (1994) describe the phytogeographic and vegetation characteristics of the two phytochoria (phytochorion, in phytogeography, is a geographic area with a relatively uniform composition of plant species. Adjacent phytochoria do not usually have a sharp boundary, but rather a soft one, a transitional area in which many species from both regions overlap), as identified by White (1983), through which the proposed ANNA transmission line route passes. These two phytochoria are the Zambezian Regional Centre of Endemism, and the Kalahari-Highveld Regional Transitional Zone.

The following description of these two phytochoria is derived from Huntley and Matos (1994).

Zambezian Regional Centre of Endemism

This centre occupies >80% of Angola, with the vegetation structure ranging from tall dry forest to open treeless grasslands, although most of the country is typical miombo woodland. Dry deciduous woodland, dominated by *Baikea plurijuga,* occupies a vast area and penetrates into the *Colophospermum mopane* formation in the Ruacana area, but is typically associated with larger trees such as *Burkea africana*, *Dialium englerianum*, *Guibourtia coleosperma*, *Pterocarpus angolensis* and *Schinziophyton rautanenii,* and range from 5 to 12 m in height (Huntley and Matos, 1994). *Colophospermum mopane* woodland dominates south-western Angola, varying from pure stands (up to 10 m in height) to mixed associations with *Acacia erubescens*, *Balanites angolensis*, *Spirostachys africana* and *Terminalia prunioides*, etc. *Colophospermum mopane* is mainly found on clay and rocky substrates and is replaced by *Baikea plurijuga* towards in the sandy western areas and *Brachystegia* formations in higher, moister areas (Huntley and Matos, 1994). The Zambezian Centre is well-represented in the protected area system of the Bicuar National Park (7 900 km^2), Mupa National Park (6 600 km^2) and Iona National Park (15 200 km^2), all within the general vicinity of the ANNA transmission line corridor as previously mentioned.

Kalahari-Highveld Regional Transitional Zone

This transition zone occurs between the Namib Desert and the Escarpment and is dominated by *Acacia* spp., *Commiphora* spp., *Colophospermum mopane*, etc., although not viewed as a significant zone in Angola (Huntley and Matos, 1994).

Dry Savanna (northern-central coastal zone and south-eastern Kalahari)

Beernaert (1997) classifies the general area as Dry Savanna. According to Beernaert (1997), *Acacia* species are dominant in this wooded savanna, although many broad-leaved trees (e.g. *Combretum* and *Terminalia*) occur in association with *Adansonia digitata*, *Sclerocarya*, *Celtis*, *Ziziphus* and *Gymosporia*.

Dry Forests, Woodlands and Savanna

Romeiras *et al.* (2014) classifies the general area as Dry Forests, Woodlands and Savanna, and identifies at least three Ecoregions (of the 15 ecoregions identified for Angola) through which the ANNA corridor traverses, namely Angolan Mopane Woodlands, Namibian Savanna Woodlands and patches of Zambezian Baikea Woodlands. Important species include *Afzelia quanzensis*, *Diospyros mespiliformis*, *Entandrophragma spicatum*, *Guibourtia coleosperma* and *Pterocarpus angolensis*.

Wetlands – Cunene River

The following extract, regarding typical "wetland" species, is included, as much of the transmission line corridor is associated with the Cunene River and its tributaries: "Although Angola is one of the wettest countries in Southern Africa, the southwest of the country is arid although extensive plateau floodplains are developed only on the Cunene River. In southern Angola these are open woodland associations comprising such species as *Acacia albida, A. erubescens, A. nigrescens, A. sieberana, Diospyros mespiliformis, Ficus burkei, F. capreifolia, F. sycomorus, Garcinia livingstonei, Kigelia pinnata, Markhanzia acuminata, Phoenix reclinata, Syzygium cordatum* and *S. guineense. Hyphaene benguellensis* is common locally, on sandy banks and islands in rivers" (Anon, 2019).

Using species-specific literature from north-western Namibia, which has similar vegetation to south-western Angola, it is estimated that at least 151 species of larger trees and shrubs (>1 m in height) occur in the general area, especially the area directly to the north of the Cunene River (Mannheimer and Curtis, 2018) (refer to Table E.1 – Annexure E).

The Angolan Red List of Species lists 30 plant species as "vulnerable", of which three species (*Adansonia digitata*, *Diospyros mespiliformis* and *Pterocarpus angolensis)* are known and/or expected to occur along the ANNA route. Although *Pterocarpus angolensis* is not included in Table E.1 of Annexure E, it was confirmed during the rapid site assessment.

For comparative purposes, the conservation and legal status of Namibian species is included, which indicates that 47 (30.5%) species of larger trees and shrubs have some kind of protected status in the general area (including endemic and near-endemic species). Some species have more than one classification. Four species (2.6%) are classified as "endemic" (*Adenia pechuelii*, *Commiphora dinteri*, *Commiphora virgata*, *Sesamothamnus leistneri*), 13 species (8.4%) are classified as "near-endemic", 31 species (20.1%) are protected by Forestry Forest Act No 12. of 2001, four species (2.6%) are protected by the Namibian Nature Conservation Ordinance no. 4 of 1975, and four species (2.6%) are listed as CITES Appendix II species (Table E.1 – Annexure E).

The species viewed as most important are the endemics – *Adenia pechuelii* (associated with rocky outcrops); *Commiphora dinteri* (widely distributed throughout western Namibia, but especially associated with the Escarpment); *Commiphora virgata* (endemic to the rocky hillsides of the Central Namib and western Kaokoveld, including Angola); *Sesamothamnus leistneri* (recently described from north-west Namibia); *Baikiaea plurijuga* classified as "near threatened" by the International Union for Conservation of Nature (IUCN) (2019); and all those protected by the Namibian Forest Act No 12. of 2001 (Table 1 – Annexure E). *Adenium boehmianum* is another species of importance in the general area, as it is potentially threatened by illegal collecting (Curtis and Mannheimer, 2005).

The Angolan Red List of Species lists 30 plant species as "vulnerable", of which three species (*Adansonia digitata*, *Diospyros mespiliformis* and *Pterocarpus angolensis)* are known and/or are expected to occur along the IAI. Although *Pterocarpus angolensis* is not included in Table E.2 (Annexure E), it was confirmed during the rapid site assessment.

Table E.2 (Annexure E) indicates the dominant larger tree and shrub species at various sites along the proposed ANNA route.

The larger species observed at the various sites were: *Acacia erioloba*, *Acacia tortilis*, *Adansonia digitata*, *Baikiaea plurijuga*, *Burkea africana*, *Colophospermum mopane*, *Combretum collinum*, *Combretum imberbe*, *Cussonia* spp., *Diospyros mespiliformis*, *Faidherbia albida*, *Ficus cordata*, *Ficus sycomorus*, *Hyphaene petersiana*, *Kirkia acuminata*, *Peltophorum africanum*, *Philenoptera nelsii*, *Pterocarpus angolensis*, *Sterculia africana*, *Steganotaenia araliacea*, *Terminalia prunioides*, *Terminalia sericea*, *Schinziophyton rautanenii* and *Sclerocarya birrea*.

The most important species are those classified by the IUCN (2019) as "near threatened" (*Baikiaea plurijuga*) (Figure 5.52) and "least concern" (*Hyphaene petersiana* and *Pterocarpus angolensis*), although most other species have not yet been assessed for the IUCN Red List, as well as species viewed as "vulnerable" under Executive Decree no. 252/18 of 13 July (*Adansonia digitata* (Figure 5.53), *Diospyros mespiliformis* and *Pterocarpus angolensis*).

The Angolan Red List of Species also lists 17 species as invasive alien to Angola. During the rapid site assessment, at least five species of invasive alien species were confirmed to occur along the IAI, mostly associated with human settlements. These are *Datura inoxia*, *Euphorbia tirucalli*, *Opunti*a spp., *Ricinus communis* and *Sisal* spp. (Figure 5.54). Although *Opunti*a spp. are, and were originally, used as fences around homesteads, various species have become invasive.

Figure 5.52: Woodland area between Cahama and Lubango - dominated by *Baikiaea plurijuga*

Figure 5.53: *Adansonia digitata* occurs in patches in the Mopane woodland areas

Figure 5.54: Invasive alien *Opuntia* spp.

Figure 5.55: Proposed Lubango substation site - degraded farmland with a few big trees and shrubs

Figure 5.56: Proposed Cahama substation site - degraded farmland with a mixture of Acacia-Mopane

Figure 5.57: Area between Calovango and Techipa - dominated by *Colophospermum mopane* shrubland (pan areas) and woodland (sandy areas)

Figure 5.58: Rocky Ruacana area - variety of tree/shrub species

Figure 5.59: Granite inselbergs and mountainous terrain east of Chibia - larger trees (*Burkea africana*, *Pterocarpus angolensis* and *Steganotaenia araliacea)* especially at the base of outcrops

5.3.2.2.2 Grass diversity

There are at least 526 species of grasses, one of the most diverse families in the flora, in Angola (Goyder and Gonçalves, 2019). However, there are no field guides with accompanying distribution maps for the general area to ease fieldwork and/or assist with identification.

Huntley and Matos (1994) include *Aristida stipitata*, *Triraphis schlecteri*, *Tristachya rehmannii*, etc. as dominant in the ***Zambezian Regional Centre of Endemism*** phytochoria, while *Aristida* spp. dominates the ***Kalahari-Highveld Regional Transitional Zone*** phytochoria.

Beernaert (1997), who classifies the general area as ***Dry Savanna (northern-central coastal zone and SE Kalahari),*** indicates that medium to tall grasses predominate, including examples such as *Hyparrhenia hirta*, *Themeda triandra*, *Heteropogon contortus* and *Trachypogon spicatus,* while *Setaria*, *Sehima* and *Ischaemum* occur on vertisol soils throughout the area.

Using species-specific literature from north-western Namibia, which has similar vegetation to south-western Angola, it is estimated that at least 58 grasses (6 to 44 species) occur in the general area, especially the area directly to the north of the Cunene River (Burke, 2005 [6 sp.]; Müller, 2007 [44 sp.]; Müller, 1984 [30 sp.]; Van Oudshoorn, 1999 [31 sp.]) (Table E.3 - Annexure E).

Up to 58 grasses are expected to occur in the general area, of which four species are viewed as endemic to Namibia, although potentially could also occur in south-western Angola (*Pennisetum foermeranum, Setaria finite, Stipagrostis damarensis and Stipagrostis sabulicola*). *Pennisetum foermeranum* is associated with rocky mountainous terrain and is consequently expected to be found in the mountainous areas, although not the surrounding gravel plain areas. The endemic *Setaria finite* and *Stipagrostis damarensis* are grasses associated with drainage lines in the general area. It is never very common and is probably the grass species likely to be affected the most by development in the area. *Stipagrostis sabulicola* is associated with the many ephemeral drainage lines throughout the western desert areas.

Except for the general ecological role of grasses (e.g. stabilising the soil, fodder/grazing value, etc.), none of the grasses are viewed as exceptionally unique in the area. The grasses commonly used for thatching, such as *Eragrostis pallens* and *Cymbopogon* species (Table E.3 - Annexure E), which also have economic value, are the important grasses in the area.

However, none of the important grasses are expected to be exclusively associated with the ANNA transmission line corridor.

5.3.2.3 Fauna

5.3.2.3.1 Reptile diversity

The reptile diversity known, and/or expected to occur, in the general area, i.e. between the Lubango substation and the Cunene River areas, is presented in Table E.4 (Annexure E). Namibian species are included, as these are also expected to occur in southern Angola.

The herpetofauna of many regions in Angola is poorly known (Branch and McCartney, 1992) with most publications dating back to prior 1975. Compared to neighbouring countries, Angola is one of the richest in terms of amphibian and reptile diversity and endemicity (e.g. 29 lizards and 7 snakes are endemic). However, species distributions are poorly known, threats have not been assessed, taxonomic problems are rife, while the species richness is viewed as underestimated. Furthermore, only one third of the reptiles and amphibians have been assessed by the IUCN, with 29 of these classified as “Data Deficient”. Probably the most comprehensive and recent publication of reptiles, is a historical atlas of all known bibliographic records by Marques *et al.* (2018).

Due to Angola’s unique geographic location, at the intersection of the central and southern regions, there are only two rare species of amphibians and reptiles. There are an estimated 273 species (278 if including marine turtles) of reptiles from Angola, of which an estimated 12% (33 species) are viewed as endemic (Marques *et al.,* 2018). Confirmed taxa from the Cunene and Huila Provinces are 56 and 102, respectively. According to the Angolan Red List of Species, one species is on the verge of extinction and ten species are listed as “vulnerable”.

At least 59 species are expected to occur in the general area, of which three species are endemic, i.e. 5.1% endemic. Of these, 33 species are expected to be from Angola but, as reptiles are under-recorded throughout the general area, many more species may occur on either side of the border. The IUCN (2019) classifies 12 species as being of “least concern”, while all the other species have not yet been assessed by the IUCN in terms of the Red List. The SARDB (2004) classifies one species as “rare” (*Naya nigricincta*), two species as “vulnerable” and one species as “safe to vulnerable”. Although *Naya nigricincta* is classified as “rare” by the SARDB, they are more common in Angola and Namibia than South Africa. CITES lists one species as C1 (*Crocodylus niloticus*) and six species as C2 species.

The 59 species expected to occur in the general area consist of at least 25 lizards (6 geckos, 5 advanced skinks, 5 old-world lizards, 1 agama, 1 plated lizard, 1 chameleon, 2 monitor lizards and 1 species each for girdled lizard and crocodile); 28 snakes (24 typical snakes and 1 species each for beaked blind snake, thread, python, burrowing asp and purple-glossed snake); 2 tortoises, 2 terrapin and 2 worm lizards.

The most important species are viewed as being the three endemics, that is all snakes (*Namibiana rostrata*, *Boaedon angolensis* and *Psammophylax rhombeatus ocellatus*) and two species listed as “vulnerable” (*Kinixys belliana*, *Crocodylus niloticus*). Other important species known to be targeted for the bush meat industry are crocodile (*Crocodylus niloticus*), monitor lizards (*Varanus niloticus and V. albigularus*) and python (*Python natalensis*) (Marques *et al.,* 2018).

The following extract regarding typical “wetland reptile fauna” species is included, as much of the transmission line route is associated with the Cunene River and its tributaries: “*Crocodylus niloticus* occurs throughout the country, but is scarce locally, while *C. cataphractus* also occurs in the northern rivers. *Varanus exanthematicus* and *V. niloticus* are both found in Angola. Snakes are plentiful in the wetlands. *Dromophis lineatus, Limnophis bicolor, Naja mossambica, Natriciteres olivacea, Philothamnus irregularis, P. ornatus, Psammophis sibilans* and *Python sebae* are common in swamps or reed beds throughout the country, while *Naja melanoleuca* occurs in swampy situations in central and northeastern districts. Arboreal snakes in the riparian forests include *Dasypeltis scabra, Dispholidus typus, Philothainnus semivariegatus* and *Thelotornis kirtlandii* (W African form)” (Anon, 2019).

Due to reptiles being an understudied group of animals, especially in Angola, it is expected that more species may be located in the general area than presented above.

5.3.2.3.2 Amphibian diversity

The amphibian diversity known, and/or expected to occur in the general area, i.e. between the Lubango substation and the Cunene River areas, is presented in Table E.5 (Annexure E). Namibian species are included, as these are also expected to occur in southern Angola.

There are an estimated 117 species of amphibians from Angola, of which an estimated 15% (18 species) are viewed as endemic (Marques *et al.,* 2018). Confirmed taxa from the Cunene and Huila Provinces are 17 and 36, respectively.

According to the literature, at least 15 species of amphibians can occur in suitable habitat in the general area. The area is under-represented, with 3 toads, 3 puddle frogs, 2 ornate frogs, 2 reed frogs and 1 species each for kassina, rubber, sand, bullfrog and platanna, known and/or expected (i.e. potentially could be found in the area) to occur in the area. Of these, one species (*Hildebrandtia ornatissima*) is endemic (6.7%). The IUCN (2019) classifies three species as “data deficient” (*Hildebrandtia ornatissima*, *Mertensophryne* aff. *mocquardi*, *Phrynobatrachus cryptotis*), 11 species as being of “least concern”, while other species not listed have not yet been assessed by the IUCN in terms of the Red List.

The most important species are viewed as the endemic and “data deficient” Angolan ornate frog (*Hildebrandtia ornatissima*), and “data deficient” Mocquard’s toad (*Mertensophryne* aff. *mocquardi*) and cryptic river frog (*Phrynobatrachus cryptotis*) (IUCN 2019). The edible bullfrog (*Pyxicephalus edulis*) is also viewed as important, as all toads consumed for food face over-utilization without any control (e.g. *Pyxicephalus adspersus* in Namibia, M. Griffin *Pers. com.*).

Due to amphibians being an understudied group of animals, especially in Angola, it is expected that more species may be located in the general area than presented above.

5.3.2.3.3 Mammal diversity

The mammal diversity known, and/or expected, to occur in the general area, i.e. between the Lubango substation and the Cunene River areas, is presented in Table E.6 (Annexure E). Namibian species are included, as these are also expected to occur in southern Angola.

In terms of its biodiversity, Angola is one of the least-known of all African countries (Rodrigues *et al.,* 2014). Although the war in Angola took a terrible toll on larger mammal species, especially those consumed for food, certain areas were spared this calamity due to people having fled the area, although they are once again venturing into these areas and impacting habitats and faunal communities (Marques *et al.,* 2018).

A study by Rodrigues *et al.* (2014) on the biogeographical regionalisation of Angolan mammals, shows four biogeographical subdivisions for ungulate distributions, probably reflecting the close association of ungulates to specific vegetation types, while rodent and carnivore data was largely uninformative.

Probably the most comprehensive and recent publication of mammals, is a chapter of mammals in a biodiversity study by Beja *et al.* (2019) which confirms at least 291 species (from the orders Rodentia [85], Chiroptera [73], Carnivora [39], and Cetartiodactyla [33]), with a large number of endemic and near-endemic species, most of which are rodents or bats. Most of the endemism is associated with the Angolan Escarpment and Afromontane Forests of western Angola. According to Beja *et al.* (2019), there is very little information on the current status of most threatened and near-threatened species, but many of them are feared extinct, or at the brink of extinction, especially large carnivores and herbivores (virtually no information on distribution and numbers). Recent surveys confirm this situation, showing that many species once common in Angola, only persist in remote areas, with small and fragmented populations.

The following are extracts from Beja *et al.* (2019):

"*Bats are represented by at least 73 species and the second most diverse order after rodents. This represents about ⅓ of the bat species known to occur in mainland Africa and almost ⅔ of the species reported for the southern Africa region making Angola a particularly rich country for bats in southern Africa.*

Rodents are represented by at least 85 species with at least 13 species being endemic or near-endemic.

Primates are represented by at least 23 species (15 diurnal and possibly 8 nocturnal species) although most are found in the rainforests and riverine forest-woodland mosaics in the north while the montane forests/dry woodland mosaics of the Angolan Escarpment along the coast, which connect to the rainforests in the north, include at least 8 species (4 diurnal and 4 nocturnal species).

Carnivores are represented by at least 38 species within 7 families, most of which belong to the family Herpestidae and although this group is one of the most studied in Angola, there are still uncertainties regarding the occurrence of some species with very little data on current distribution and abundance.

Cetartiodactyla are represented by at least 33 species within 5 families most of which belong to the family Bovidae (27 species) and although this group is one of the best."

Various other mammals are also known from Angola: hedgehog (1 species), hyrax (4 species), hares (2-3 species), sengi (3 species), zebra (2 species), pangolin (3 species), elephant (2 species), hippo (1 species), fur seal (1 species), manatee (1 species), shrew (15 species) and aardvark (1 species). Black rhino is viewed as extirpated from Angola.

According to the Red List of Species for Angola, two species are classified as extinct, 19 species classified as on the verge of extinction and 18 species classified as vulnerable.

According to literature, at least 127 species of mammals are known, and/or expected, to occur in the general area, of which 25 species are expected to occur in Angola and not Namibia. At least five species are probably extirpated from south-western Angola, but are included here, should remnant populations still occur in some inaccessible areas, especially in the mountainous Ruacana area (Table E.6 - Annexure E). Seven species are classified as "vulnerable" (*Loxodonta africana*, *Smutsia (Manis) temminckii*, *Acinonyx jubatus*, *Panthera leo*, *Panthera pardus*, *Equus zebra hartmannae*, *Hippopotamus amphibious*, *Aepyceros melampus petersi*) and six species as "near threatened" (*Eidolon helvum*, *Epomophorus angolensis*, *Hipposideros vittatus*, *Parahaena (Hyaena) brunnea*, *Aonyx capensis*, *Hydrictis (Lutra) maculicollis*) by the IUCN (2019).

The most important species are those listed by the IUCN (2019) as "vulnerable" (*Loxodonta africana*, *Smutsia (Manis) temminckii*, *Acinonyx jubatus*, *Panthera leo*, *Panthera pardus*, *Equus zebra hartmannae*, *Hippopotamus amphibious*, *Aepyceros melampus petersi*) and "near threatened" (*Eidolon helvum*, *Epomophorus angolensis*, *Hipposideros vittatus*, *Parahaena (Hyaena) brunnea*, *Aonyx capensis*, *Hydrictis (Lutra) maculicollis*), as well as species classified under the Angolan Red List of Species as "on the verge of extinction" (*Papio ursinus*, *Proteles cristatus*, *Crocuta crocuta*, *Acinonyx jubatus*, *Panthera leo*, *Suricata suricatta*, *Vulpes chama*, *Equus zebra hartmannae*, *Giraffa camelopardalis*, *Sylvicapra grimmia*) and "vulnerable" (*Orycteropus afer*, *Loxodonta africana*, *Smutsia (Manis) temminckii*, *Panthera pardus*, *Caracal caracal*, *Felis silvestris*, *Leptailurus serval*, *Civettictis civetta*, *Otocyon megalotis*, *Canis adustus*, *Canis mesomelas*, *Hydrictis (Lutra) maculicollis*, *Mellivora capensis*, *Equus burchellii*). Brown hyaena (*Parahaena (Hyaena) brunnea*) is viewed as "extinct" in the Angolan Red List of Species.

Some species such as the African clawless otter, spotted-necked otter, hippopotamus, etc., are only associated with a specific habitat (e.g. the Cunene River), while other species such as the African elephant, lion, etc., probably only occasionally occur in the general area and not along the entire IAI.

The following extract regarding typical "wetland mammal fauna" species, is included, as much of the transmission line route is associated with the Cunene River and its tributaries: "Wetland species (small mammals) include at least 12 species (*Aonyx capensis, Atilax paludinosus, Dasyntys incomtus, Genetta tigrina, Lutra maculicollis, Otomys angoniensis, Pelomys fallax, Potamogale velox* (N and NE only) and *Thryonomys swinderianus,* while *Ichneumia albicauda, Leptailurus serval* and *Mungos mungo* are occasional visitors) while large mammals frequenting wetlands include at least 11 species (*Aepyceros melampus, Hippopotamus amphibius, Kobus ellipsiprymnus, K. leche, K vardoni, Loxodonta africana, Potamochoerus porcus, Raphicerus sharpie* [reedbeds, S only], *Redunca arundinum, Tragelaphus spekei* and *Syncerus caffer*). Twelve species are often seen on the southern and southeastern floodplains after the floods have subsided (*Acinonyx jubatus, Alcelaphus buselaphus, Connochaetes taurinus, Crocuta crocuta, Equus burchelli, Hippotragus equinus, Loxodonta africana, Lycaon pictus, Panthera pardus, Sylivicapra grimmia, Syncerus caffer* and *Tragelaphus strepticeros*). Occasional visitors to riverine reedswamps include *Hippotragus equinus, H. niger* with *Panthera pardus* being the principal large predator in swamps. *Funisciurus pyrrhops* and *Protoxerus stangeri* are two squirrels which live in seasonally inundated forests" (Anon, 2019).

Habitat alteration and over-utilization are the two primary processes threatening most mammals (Griffin, 1998c), with species probably under-represented in Table E.6 (Annexure E) for the general area, these being the bats and rodents, as these groups have not been well documented from this part of Angola.

5.3.2.3.4 Bird diversity

The bird diversity known, and/or expected, to occur in the general area, i.e. between the Lubango substation and the Cunene River area, is presented in Table E.7 (Annexure E). Namibian species are included, as these are also expected to occur in southern Angola.

Very few studies on birds were conducted between the early 1970's to 2002, due to the civil war, although this has changed since the early 2000's, with new species being added to the list and a steady rise seen in publications on biogeography and the biology of birds. There are at least 940 bird species known from Angola, including at least 29 endemic species, and several species that are rare (35 species), uncommon (134 species) or poorly known (Dean *et al.,* 2019).

Most endemic species occur within two core habitats, namely the forests of the Western Escarpment and remnants of the Afromontane forest of the highlands (Dean *et al.,* 2019). The Lubango-Namibe arid bushveld and desert area (along the ANNA route) is viewed as one of the key birding areas in Angola, with unique species present, such as Cinderella waxbill, Benguela long-billed lark and Rüppell's korhaan (Dean *et al.,* 2019). Wetland bird species from southern rivers, lagoons and reed swamps include at least 49 species, while species identified in the riparian woodlands and swamp forests of central and southern Angola include at least 59 species (Anon, 2019).

At least 251 species of terrestrial ("breeding residents or breeding migratory") birds occur, and/or could occur, in the general area at any time (Hockey *et al.,* 2006; Maclean, 1985; Simmons *et al.,* 2015; Tarboton 2001). Aquatic species, and species associated with the Cunene River and its tributaries or which is dependant in some way on the rivers (e.g. breeding, roosting and feeding), are included here. Not all the species included in Table E.7 (Annexure E) would occur along the entire study area, as some species would be limited to the interior woodland areas, away from the Cunene River, while others are only expected to be associated with aquatic habitats.

The IUCN (2019) classifies two species as "critically endangered" (white-backed vulture, white-headed vulture), four species as "vulnerable" (southern ground-hornbill, tawny eagle, martial eagle, secretarybird) and two species as "near threatened" (kori bustard, bateleur), while all the other species are classified as being of "least concern" or have not yet been assessed by the IUCN in terms of the Red List. Of the 29 endemic species, at least two species (Angolan cave chat (*Xenocopsychus ansorgei*) and the Cinderella waxbill (*Estrilda thomensis*)) occur in the general area, although both species are also known to occur in Namibia (Dean *et al.,* 2019). According to Executive Decree no. 252/18 of 13 July (Red List of Species for Angola), one species is viewed as extinct, seven species are on the verge of extinction and 31 species are viewed as vulnerable. Mills and Melo (2013) list 12 species as special birds to see in Angola (see Table E.7 - Annexure E).

The most important species are those listed by the IUCN (2019) as "critically endangered" (white-backed vulture, white-headed vulture), "vulnerable" (southern ground-hornbill, tawny eagle, martial eagle, secretarybird) and "near threatened" (kori bustard, bateleur), as well as the two endemic species (Angolan cave chat and Cinderella waxbill) and species classified as on the "verge of extinction" (Angolan cave chat and Cinderella waxbill) and "vulnerable" (ostrich, Monteiro's hornbill, Damara hornbill, Carp's tit, Laupula cisticola, Herero chat) under the Angolan Red List of Species.

Due to birds being an understudied group of animals, especially in Angola, it is expected that more species may be located in the general area than presented above.

5.3.2.4 Important species

5.3.2.4.1 Flora and habitats

As mentioned before, Executive Decree no. 252/18 of 13 July (Red List of Species for Angola) lists 30 plant species as "vulnerable", of which three species (*Adansonia digitata*, *Diospyros mespiliformis* and *Pterocarpus angolensis)* are known, and/or expected, to occur along the IAI. The most important species are those classified by the IUCN (2019) as "near threatened" (*Baikiaea plurijuga*) and of "least concern" (*Hyphaene petersiana* and *Pterocarpus angolensis*), although most other species have not yet been assessed for the IUCN Red List, as well as species viewed as "vulnerable" under the Red List of Species (*Adansonia digitata*, *Diospyros mespiliformis* and *Pterocarpus angolensis*).

Trees used for building structures, makoro (wooden canoe) building and for firewood, are important species in the general area. *Pterocarpus angolensis* is an important timber tree with economic importance in the area, while *Burkea africana* is used for timber and charcoal production. *Berchemia discolour*, *Guibourtia coleosperma* and *Schinziophyton rautaneni* are important food plants, with the fruit and oil being utilised as relish, food, cooking and fermentation for alcohol (Mendelsohn *et al.,* 2002).

The most important grass species are viewed as the endemic species (*Pennisetum foermeranum*, *Setaria finite*, *Stipagrostis damarensis* and *Stipagrostis sabulicola*) although, except for their general ecological role (e.g. stabilising the soil, fodder/grazing value, etc.), none of the grasses are viewed as exceptionally unique in the area. The grasses commonly used for thatching, namely *Eragrostis pallens* and *Cymbopogon* species, which also have economic value, are the important grasses in the area.

5.3.2.4.2 Terrestrial fauna

The most important reptile species are viewed as the three endemic species – all snakes (*Namibiana rostrata*, *Boaedon angolensis* and *Psammophylax rhombeatus ocellatus*), and two species listed as "vulnerable" (*Kinixys belliana*, *Crocodylus niloticus*). Other important species known to be targeted for the bush meat industry are crocodile (*Crocodylus niloticus*), monitor lizards (*Varanus niloticus and V. albigularus*) and python (*Python natalensis*) (Marques *et al.,* 2018).

As for amphibians, the most important species are viewed as the endemic and "data deficient" Angolan ornate frog (*Hildebrandtia ornatissima*) and the "data deficient" Mocquard's toad (*Mertensophryne* aff. *mocquardi*) and cryptic river frog (*Phrynobatrachus cryptotis*) (IUCN, 2019). The edible bullfrog (*Pyxicephalus edulis*) is also viewed as important, as all toads consumed for food face overutilization without any control (e.g. *Pyxicephalus adspersus* in Namibia, M. Griffin *Pers. com.*).

In the mammal group, the most important species are those listed by the IUCN (2019) as "vulnerable" (*Loxodonta africana*, *Smutsia (Manis) temminckii*, *Acinonyx jubatus*, *Panthera leo*, *Panthera pardus*, *Equus zebra hartmannae*, *Hippopotamus amphibious*, *Aepyceros melampus petersi*) and "near threatened" (*Eidolon helvum*, *Epomophorus angolensis*, *Hipposideros vittatus*, *Parahaena (Hyaena) brunnea*, *Aonyx capensis*, *Hydrictis (Lutra) maculicollis*), as well as species classified under the Angolan Red List of Species as being "on the verge of extinction" (*Papio ursinus*, *Proteles cristatus*, *Crocuta crocuta*, *Acinonyx jubatus*, *Panthera leo*, *Suricata suricatta*, *Vulpes chama*, *Equus zebra hartmannae*, *Giraffa camelopardalis*, *Sylvicapra grimmia*) and "vulnerable" (*Orycteropus afer*, *Loxodonta africana*, *Smutsia (Manis) temminckii*, *Panthera pardus*, *Caracal caracal*, *Felis silvestris*, *Leptailurus serval*, *Civettictis civetta*, *Otocyon megalotis*, *Canis adustus*, *Canis mesomelas*, *Hydrictis (Lutra) maculicollis*, *Mellivora capensis*, *Equus burchellii*). The Brown hyaena (*Parahaena (Hyaena) brunnea*) is viewed as "extinct" in Angola, in accordance with Executive Decree no. 252/18 of 13 July (Red List of Species for Angola).

Finally, the most important avifaunal species are those listed by the IUCN (2019) as "critically endangered" (white-backed vulture, white-headed vulture), "vulnerable" (southern ground-hornbill, tawny eagle, martial eagle, secretary bird) and "near threatened" (kori bustard, bateleur), as well as the two endemic species (Angolan cave chat and Cinderella waxbill) and species classified as on the "verge of extinction" (Angolan cave chat and Cinderella waxbill) and "vulnerable" (ostrich, Monteiro's hornbill, Damara hornbill, Carp's tit, Laupula cisticola, Herero chat) under the Angolan Red List of Species.

5.3.2.5 Important habitats

The areas considered more important, mostly due to the presence of significant habitats for avifauna (as this is the group most likely to be affected by the implementation of the ANNA project) are presented in Figure 5.60 to Figure 5.62, and include three "High Risk" and "Medium Risk" areas, respectively. While these habitats are important mostly from an avifaunal perspective, it is however salient to emphasise that the study area does not include any critical habitat (as defined by the DBSA and IFC) is found within the affected region.

Granite Inselbergs (High Risk)

The granite inselbergs east of Chibia (Figure 5.60 and Figure 5.63) are viewed as "High Risk" areas, especially for avifauna, mainly due to the presence of larger raptors (e.g. eagles, vultures), as these birds follow certain geological and/or landscape features (e.g. rivers, mountain ranges, etc.) whilst foraging and/or migrating. In other words, they use mountains as flyways. Furthermore, numerous "pylon-sensitive" bird species are known to be associated with the mountainous areas, such as various large eagles and vultures, and/or potentially pass through the general area, such as ducks, cranes, flamingos, and pelicans.

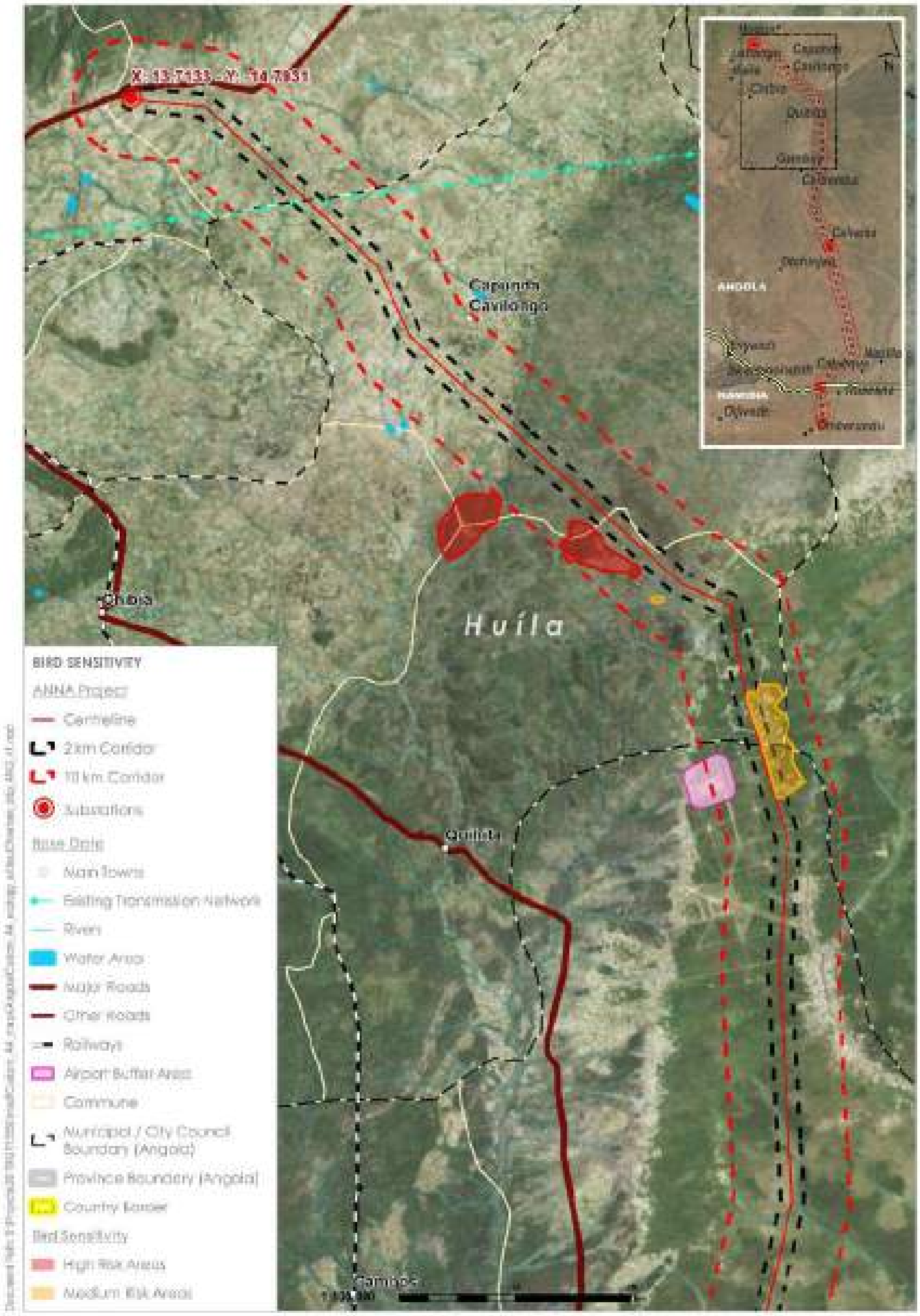


Figure 5.60: Important habitats/areas for avifauna (Lubango to Gambos)

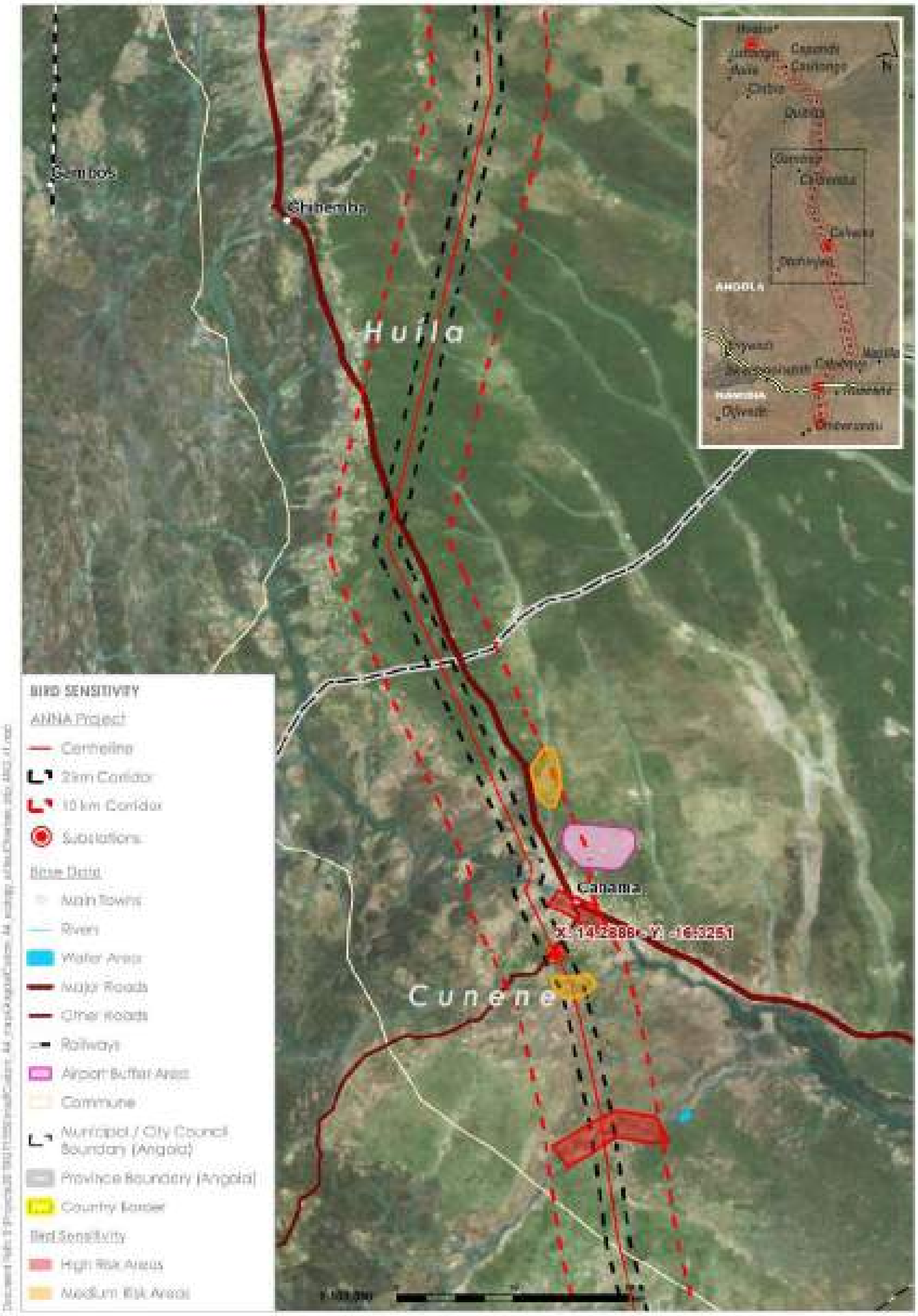


Figure 5.61: Important habitats/areas for avifauna (Gambos to Cahama)

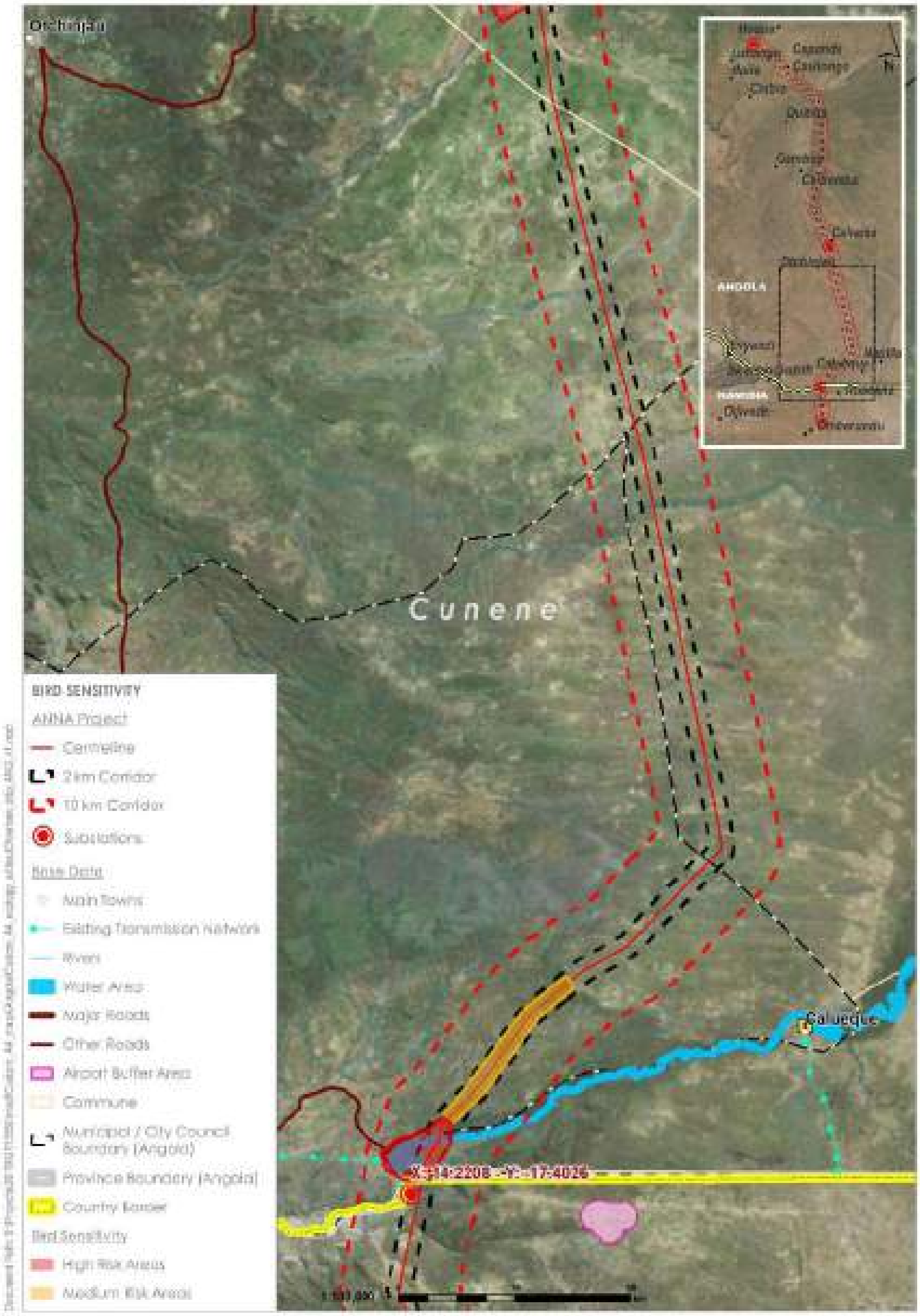


Figure 5.62: Important habitats/areas for avifauna (Otchinjau to Namibia)

Figure 5.63: Granite inselbergs east of Chibia (High Risk habitat for avifauna)

Caculuvar River (High Risk)

The Caculuvar River (Figure 5.61 and Figure 5.64), and associated riparian vegetation habitat, is viewed as a “High Risk” area, especially for avifauna, as this watercourse presents large trees associated with the riparian vegetation, particularly west of Cahama (Figure 5.61), in particular for larger aquatic species such as the African fish eagle, ducks, herons, storks, etc.

Figure 5.64: Caculuvar River (High Risk habitat for avifauna)

Cunene River (High Risk)

The Cunene River, and associated riparian vegetation habitat (Figure 5.65) west of Calueque, is viewed as a “High Risk” area, particularly for avifauna, as it is the only perennial river in an otherwise extremely marginal environment (Figure 5.62), especially for larger aquatic species such as the African fish eagle, ducks, herons, storks, etc. Numerous “pylon-sensitive” bird species are known to be associated with the Kunene River, e.g. various large eagles, herons, storks, vultures, and/or potentially pass through the general area such as ducks, cranes, flamingos, and pelicans.

Figure 5.65: Kunene River (High Risk habitat for avifauna)

Ephemeral river/Pan system (Medium Risk)

The ephemeral river and pan system habitat in the Munano/Uvaie area, west of the Bicuar National Park (Figure 5.66), is viewed as a "Medium Risk" area, especially for avifauna, as all water features in an otherwise extremely marginal environment are important (Figure 5.60), particularly for larger aquatic species such as ducks, herons, storks, etc.

Figure 5.66: The ephemeral river/pan system (Medium Risk habitat for avifauna)

Ephemeral river/Pan system (Medium Risk)

The ephemeral river and pan system habitat north-east of Cahama (Figure 5.67) is viewed as a "Medium Risk" area, especially for avifauna, as all water features in an otherwise extremely marginal environment are important (Figure 5.61), particularly for larger aquatic species (e.g. ducks, herons, storks, etc.) and other species frequenting such open habitat such as the African ground hornbill, secretary bird, etc.

Figure 5.67: The ephemeral river/pan system, north-east of Cahama (Medium Risk habitat for avifauna)

Ephemeral River (Medium Risk)

The ephemeral river and riparian vegetation in the Calovango area (Figure 5.68) is viewed as a "Medium Risk" area, especially for avifauna, as all water features, albeit temporary, with large trees, in an otherwise extremely marginal environment, are important (Figure 5.68), especially for species breeding/roosting in large trees (e.g. eagles, hornbills, vultures).

Figure 5.68: Well vegetated ephemeral river with large trees in the Calovango area (Medium Risk habitat for avifauna).

5.3.3 Ecosystem services in the study area

Ecosystem services provide benefits that are used by humans and, in doing so, affect human wellbeing such as livestock, ground/surface/fresh/salt water, fish, soil formation/composition, tourism, recreation, spiritual interactions, etc. The Cunene and Huíla Provinces have few ecosystem services compared to other regions such as Uíge and Cuando Cubango, mainly due to climate change issues such as drought and flooding which are exacerbated by overgrazing, mainly by cattle. The vitality of the main ecosystem services in the Cunene and Huíla Provinces are ranked as low, namely 6.5/20 and 10.4, respectively (Anon, 2014), while the main ecosystem services (rankings out of 20 in parentheses for Cunene and Huíla Provinces) are viewed as:

- Firewood products (10, 10)
- Animal protein (5, 10)
- Use of leaves and roots (5, 15)
- Non-firewood products (5, 10)
- Hydrographic basins (5, 15)
- Medicinal plants (5, 10)
- Agroforests (5, 5)
- Wild food plants (5, 10)
- Ornamental plants (0, 5)
- Regulation of microclimate (10, 15)
- CO^2 sequestration (0, 0)
- Mangroves (5, 0)
- Wetlands (0, 15)
- Rivers (10, 8)
- Ravine prevention (sic – erosion prevention) (8, 15)
- **Total quality of ecosystem services** (6.5, 10.4)

As the Cunene Province (Zambezian Regional Centre of Endemism and Kalahari-Highveld Regional Transitional Zone) borders north-western Namibia, the key ecosystem services are expected to be similar to those published for Namibia by Harper-Simmonds *et al.* (n.d). The key ecosystem services in Namibia include:

Provisioning

- Livestock;
- Wild animals;
- Plants for material and energy use;
- Surface water; and
- Ground water.

Regulation and Maintenance

- Soil formation and composition;
- Ground water recharge;
- Mediation of waste and pollution;
- Global and regional climate regulation; and
- Ventilation and transpiration.

Cultural

- Physical interactions; and
- Spiritual, symbolic and intellectual interactions.

The broad drivers of change in the Western Highlands ecosystem zone, with their ecosystem-specific pressures (in parentheses), are viewed as:

- Habitat change (overgrazing);
- Exploitation (abstraction of groundwater, increase in livestock numbers);
- Pollution (no relevant pressures identified);
- Invasive species (no relevant pressures identified);
- Climate change (more extreme climatic conditions such as current drought being experienced); and
- Illegal use (poaching – e.g. black rhino).

5.3.4 Future climate change scenario

The future climate change scenario that was established to inform the project (see Section 5.2.1) generally highlights a number of climatic patterns which could affect, and is currently affecting, the baseline environment described above.

It is projected that there will be an increase in the number of days exhibiting extreme daytime temperatures, as well as the number and duration of heatwave events. Furthermore, a greater number of warm nights will increase general discomfort and reduce overnight frost and morning dew.

The rainfall parameters are more complex, but there is general agreement that in areas where either increasing or decreasing rainfall volumes are expected, rainfall will be focussed into a shorter timeframe. Some areas are exhibiting a shift in the rainfall onset and cession timing. The rain season is decreasing in length and, in the frontal areas of the western and southern areas of the country, the winter rainfall period is compressed, and the dry summer is extended. To the east and north, the convective rainfall is clustered into fewer summer months and the shoulder seasons of autumn and spring exhibit more summer-like temperatures with reduced rainfall. While it is generally expected that there will be a decrease in the number of rainfall days each year, it is highly likely that there will be an increase in precipitation intensity and the occurrence of more extreme events when it does rain. This is particularly true in the summer convective rainfall areas. There will also be an increase in the duration of dry spells between rainfall events.

South-western Angola is particularly vulnerable to climate change due to its arid nature and high dependence on the natural resource base (Anon, 2014). Drought events have the potential to devastate the fragile ecosystems in this part of Angola, and the livelihoods of people who depend thereon. Shifts in the distribution patterns of rainfall, evaporation and temperature are likely to affect the distribution and range of animals and plants. Vertebrate fauna, and flora with specific habitat requirements (i.e. range-restricted species like tortoises, amphibians and *Adenia pechuelii* (elephant's foot)) are less adaptable to environmental change and would be affected most, while ecosystems dependent on regular rainfall with low variation (aquatic) are expected to be adversely affected over time.

5.4 Socio-economic environment

5.4.1 Demographic and socio-economic aspects

5.4.1.1 Introduction

This section presents the description of the affected socio-economic environment. This description complements and elaborates on the baseline in the scoping report, detailing the analysis at the scale of the area of influence and in relevant magnitudes to better understand the interaction of the project with the dynamics of the area being studied.

The first level of analysis is focussed on the IAI and contextualises the existing status of the area in terms of the communities affected by the project, focussing the approach on the following:

- Population (structure, distribution and ethno-linguistic characteristics);
- Economic activities (productive structure, employment situation);
- Living conditions (physical conditions, health and education access, poverty);
- Utilities (energy and water);
- Transport; and
- Governance model.

The second level of analysis is focussed on the DAI and intends to identify the existing land cover and uses that could potentially be directly affected by the project, as well as the community's expectations.

5.4.1.2 Indirect Area of Influence (IAI)

Geographically located in southern Angola, the IAI considered for the project covers the Municipalities of Lubango, Chibia, Gambos, Cahama, Curoca and Ombadja, occupying an area of 46 457 km^2.

Three municipalities, namely **Lubango, Chibia and Gambos**, are part of the 14 municipalities within the province of Huila, the capital of which is located in the Municipality of Lubango.

- The **Municipality of Lubango** is located in the south-western area of the Huila province, bordering the Municipalities of Quilengues (north), Bibala (integrated into the province of Namibe (north-east)), Humpata (south-east), Chibia (south-southwest) and Cacula (to the west). It consists of the communities of Arimba, Hoque, Huila, Lubango and Quilemba which, together, occupy a combined surface area of 3 140 km^2 (the smallest of the IAI).
- The **Municipality of Chibia** is located in the south-eastern sector of the Huila province. It borders the Municipalities of Lubango (north-northeast), Cacula (north), Humpata (west), Gambos (south) and Quipungo (east). Its surface area of 5 180 km^2 includes the communities of Capunda Cavilongo, Chibia, Jau and Quihita.
- The **Municipality of Gambos** (ex. Chiange), geographically located in the south-east of the Huila province, is bordered to the north by the Municipalities of Chibia and Quipongo, to the east with the Municipality of Matala, and to the south with the Municipalities of Cahama and Curoca that are both part of the province of Cunene. It consists of the communities of Gambos and Chimbemba, occupying a total area of 8 150 km^2.

The remaining municipalities of the IAI, namely **Cahama, Curoca and Ombadja**, belong to the six municipalities that are part of the Cunene Province, the capital of which is Ondjiva, located in the Municipality of Cuanhama.

- The **Municipality of Cahama** is situated in the north-east of the Cunene province. With a surface area of 9 725 km^2, it integrates, from a political and administrative point of view, the communities of Cahama and Otchinjau. It is bordered to the north by the Municipalities of Gambos and Matala of the Huila Province, to the west-southwest by the Municipality of Curoca, and to the south-southeast by the Municipality of Ombadja.
- The **Municipality of Curoca** (ex. Oncocua), located in the east of the Cunene province, is comprised of the communities of Chitado and Curoca (which is home to the town hall - Oncocua), totaling an area of 7 998 km^2. The Gambos Municipality of the Huila Province lies to the north of it, Cahama to the north-northeast), Ombadja to the east, and Tómboa and Virei to the west (both part of the Namibe Province). To the south the Municipality of Curoca borders with the country of Namibia.

- The **Municipality of Ombadja**, the largest in the IAI in terms of size, at 12 264 km^2, is situated in the centre/south of the Cunene province. It is bordered to the north by the Municipalities of Matala (Huila province) and Cuvelai, to the west by the Municipality of Cahama, south-southwest by the Municipality of Curoca, in the east by the Municipalities of Cuanhama and Namacunde and to the south with Namibia. It consists of the communities of Humbe, Mucope/Mucoma, Naulila, Ombala-Yo-Mungo and Xangongo (which houses the town hall).

5.4.1.2.1 Population

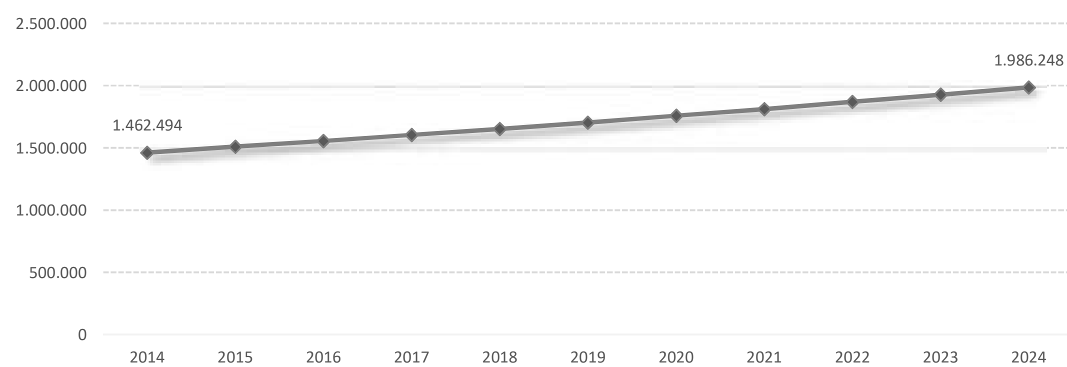
The following table summarises the demographic key indicators analysed in terms of the IAI.

Table 5.17: Demographic key indicators of the IAI

Total population	1 462 494 inhabitants
Gender ratios	89.8 men per 100 women
Average age	20 years
Gross birth rate	378 births per 1 000 inhabitants
Average life expectancy at birth	59.6 years
Population density	2.8 / per km^2
Rural population	54.4%

Source: National Institute of Statistics (INE), 2016.

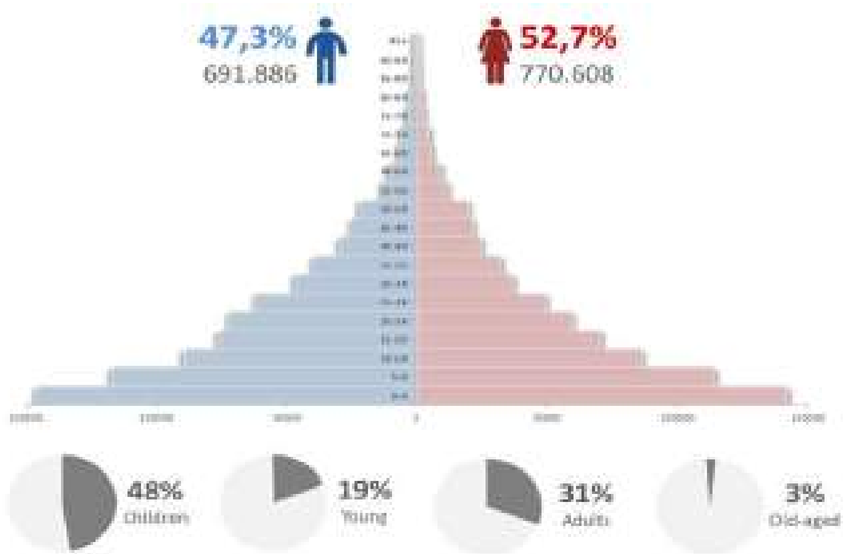
According to the General Population and Housing Census conducted in the country in 2014 by INE - Census 2014 (the first that took place after independence), 1 462 494 inhabitants resided in the project's IAI, which could increase to 1 986 248 inhabitants by 2024, according to INE projections.



Source: INE, 2016.

Figure 5.69: Population evolution – projections (number of inhabitants), 2014-2024

The population structure shows slightly more females than males (89.8 men for every 100 women), and a young age pyramid (average age 20) - wide at the bottom, with a high percentage of children (0-14 years), and narrow at the top, with a small number in the elderly age group (65 years and older). This type of pyramid is explained by the high gross birth rate (378 births per 1 000 inhabitants per year) and the reduced average life expectancy at birth (59.6 years).

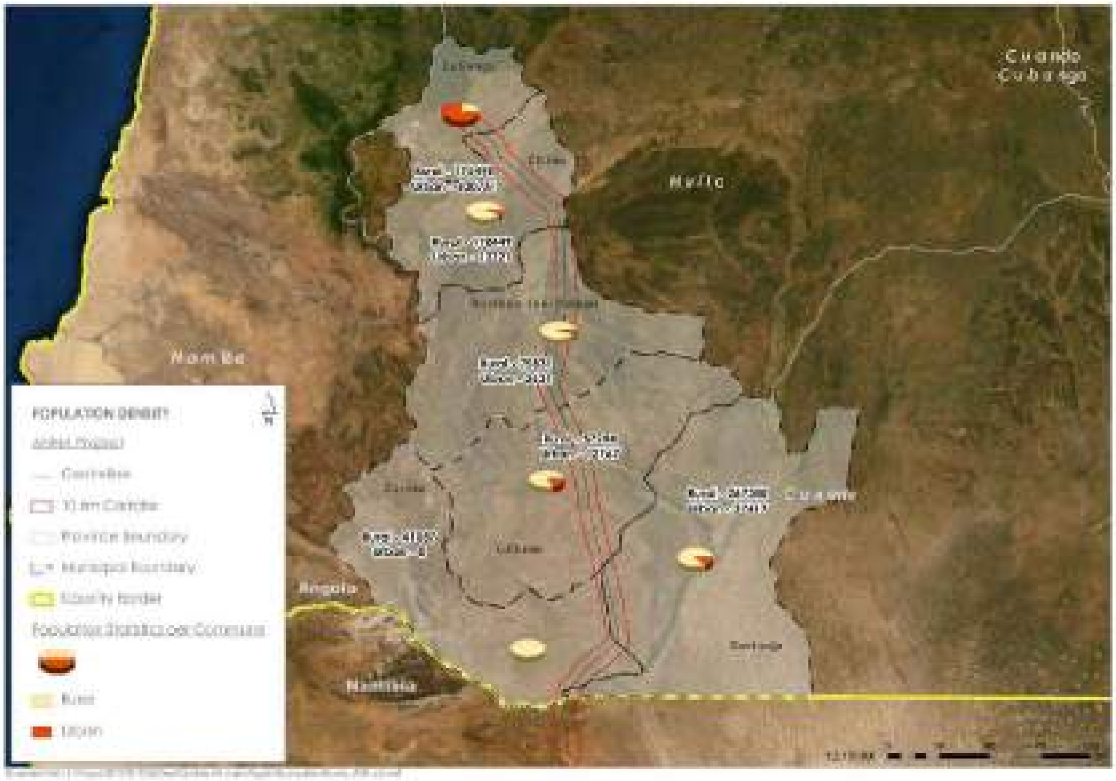


Source: INE, 2016

Figure 5.70: Population structure (%), 2014

The distribution of the population depicts a territory with a low population density (32 inhabitants/km^2), which is still higher than the country's average density (20.7 inhabitants/km^2) but maintains the characteristics of a rural territory with 54.4% of the population concentrated in rural areas. Below is a disaggregation of the analysis by municipalities within the IAI:

- In 2014, Lubango was the geographical area with largest population (776,249 inhabitants, 53.1% of the IAI), with 247.21 inhabitants/km^2, and the most urban (74.4% of its population).
- At the opposite end of the scale by a large margin, is Curoca, with the smallest population (41 087 inhabitants, 2.8% of the IAI), with 5.14 inhabitants/km^2, and completely rural (100% of its population are in rural areas).



Source: INE, 2016

Figure 5.71: Population distribution by municipality, 2014

The growth of existing urban areas in the IAI resulted from the flow of population from rural areas, due to people migrating to cities to escape the effects of the Angolan civil war. These areas constitute an unbalanced top-heavy network, with a large town, namely Lubango, occupying the top of the hierarchy in terms of its size (demographic and functional). This town is the most important urban centre in the south of Angola, with an urban population of over 600 000 inhabitants, where the Provincial Government, the provincial delegations of the Ministries, the regional directorates of public bodies and companies are located, as well as the main services. Lubango is situated in the north-west of the IAI, at the confluence of the main transport infrastructure, and reflects a territorial influence due to its attractiveness, both in terms of population and investment.

Figure 5.72: Town of Lubango

On the next hierarchical level is the village of Cahama, followed by Xangongo. The village of Cahama, located in the same municipality, is located along National Road 105 and on the left bank of the Caculuvar River. It is therefore one of the main crossing points of this river for inland road distribution, standing out as the first urban centre of the province of Cunene and the main logistics centre of the north of the province. Xangongo, the second urban centre of the Cunene province, is a mandatory crossing point for migratory and trade flows between Angola and Namibia and is also the main crossing point over the Cunene River for the entire Lower Cunene region.

Figure 5.73: Cahama Village (peri-urban area above, urban area below)

This primary urban network is complemented by a secondary network of small villages, which play an important role as seats of municipalities (villages of Chibia and Gambos) and seats of communities (villages of Capunda-Cavilongo, Otchinjau, Ombala-Yo-Mungo and Humbe).

Figure 5.74: Village of Chibia

Figure 5.75: Village of Gambos

Despite being a low-density territory, the IAI is characterised by a mosaic of ethnic diversity, distinguished by its own geographical distribution, activities, traditions and languages (although Portuguese is the official language of the country). According to the field interviews, the present population belongs mainly to the Bantu ethnolinguistic family (predominant language of southern Africa), represented by *Nyaneka-nkhumb* and *Hereros*.

Subdivided into several subgroups, the *Nyaneka-nkhumb* migrated to Angola around the 16th century, leaving the southern part of the country to settle in various locations on the Huila plateau. It was the Nyanekas (represented mainly by the Mumuila), the largest subgroup of the family, to settle in the study area in its northern and central sector, and who are traditionally organised according to a matriarchal social system (under the guidance of a chief). They speak the Nyaneka language and are traditionally engaged in agriculture. A significant characteristic of this group has been the loss of traditional rites, habits and customs of their culture, with life today being lived according to a modern lifestyle, although in certain areas of Chibia, Gambos and Lubango it is still possible to observe the *Nyaneka-nkhumbi* tradition being practised.

As we move south (mainly in the municipalities of Curoca and Ombadja), the *Hereros* assume a greater presence. Their long migratory process (originating from Botswana, passing through Namibia and settling in south-west Angola) have resulted in several subgroups sharing the same language as *Otjihehero*. Those who remained in the study area were renamed *Dimbas* (or *Mudimbas*). They are known as livestock breeders and keepers and are very resistant to change, preserving the ancient cultures transmitted by their ancestors, which results in the international community classifying them as an indigenous people. They are usually distinguished by their unusual appearance which may vary with their geographic location and/or acculturation. They may be scantily covered with animal-skin garments, wearing necklaces, bracelets and other adornments, and the women can easily be identified by the reddish hue of their skin which they treat with a mixture of animal fat (extracted from milk) and red ochre clay. By tradition, hairstyles and adornments change as children mature and acquire different statuses and certain rituals are practised to mark various stages of development (from birth, through puberty, for marriage and death), all centred around the sacrifice of an ox.

In addition to the mentioned groups, the consulted references suggest the presence, in certain areas of the IAI, of the *San* (from the *Khoisan* ethnolinguistic group of the non-Bantu family, one of the oldest ethnic groups living in south-west Africa). This group of hunters (also known as *Bushmen* or *Boxmen)* still preserve the habits, uses and customs of nomadism. Like the *Muhimba*, the *San* are also considered by the international community as an indigenous people.

Mumuila woman

Muhimba women

San woman (https://vivimetaliun.wordpress.com, consulted in august 2019)

Figure 5.76: Existing ethnolinguistic groups

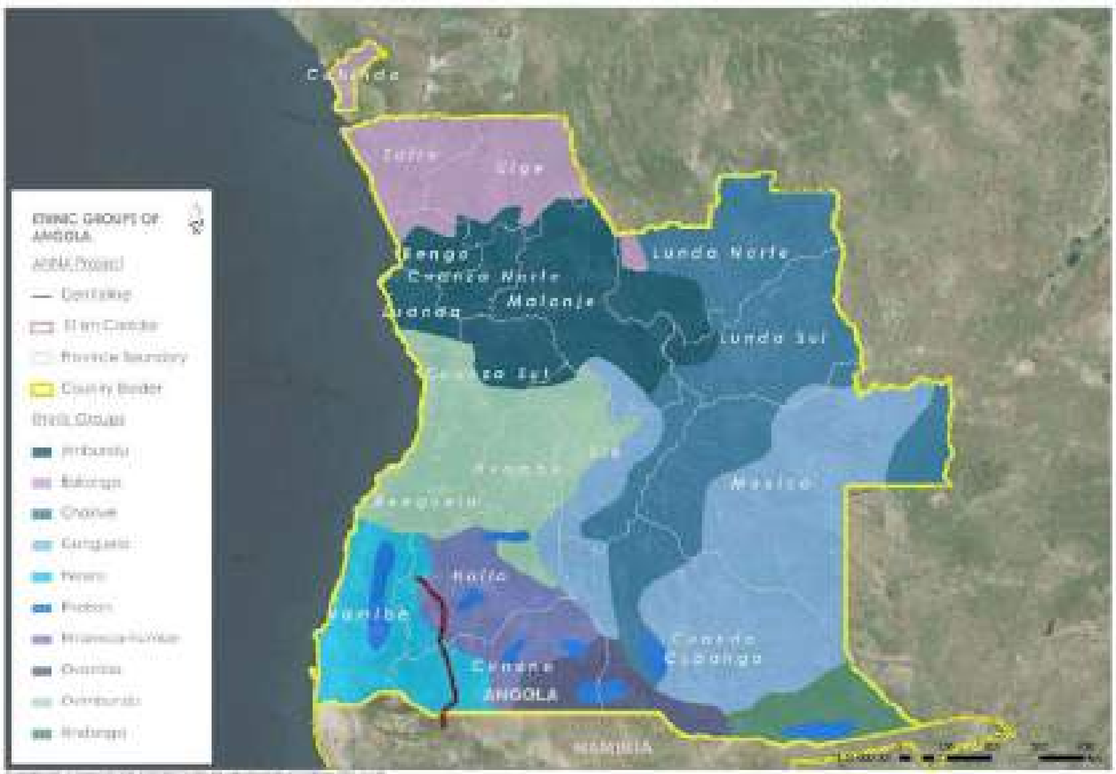


Figure 5.77: Ethnic groups present in the IAI

5.4.1.2.2 Economic activity

The following table summarises the primary economic indicators in the IAI.

Table 5.18: Primary economic indicators, 2014

Main economic activities	Agriculture and Livestock
Distribution of employed population	59.2% (Primary sector) 30.8% (Secondary Sector) 10.0% (Tertiary Sector)
Unemployment rate	23.6%
Unemployment rate in women	24.1%
Unemployment rate in men	23.2%

Source: INE, 2016

Productive structure

According to the interviews conducted, the primary sector, represented by agriculture and livestock, is the most important activity in the productive structure of the IAI, and is from which communities obtain their main source of food supply and income. It is therefore an activity of fundamental socio-economic importance, which is practiced by the vast majority of rural households.

In general, **agriculture** is the main economic activity of the areas along the banks of the Caculuvar River (mainly in the municipalities of Lubango and Chíbia) and the Cunene River (municipality of Ombadja), where current productive soils offer better conditions. Three methods of cultivation are practiced: (i) individual, on small farms (traditional peasant families); (ii) collective, on small and medium farms (peasant associations or co-operatives); or (iii) corporate, on large farms (farms).

The largest portion of agricultural activity is practiced on individual and collective farms, where land is cultivated in a rudimentary manner. The production system, mainly under rainfed conditions, is composed of cereals that are more resistant to irregularities of rainfall, such as massango, massambala and maize, as well as certain varieties of beans in areas with the highest rainfall. All production is mainly for self-consumption and, when there is a surplus, this is used for informal trade. To a lesser extent, corporate farming is still underdeveloped in the study area, and is generally concentrated where irrigation is possible, such as the Gangelas irrigation perimeter, located approximately 45 km south of Lubango city, in the Municipalities of Chibia and Ombadja, on the banks of the Cunene river. It is an activity mainly focussed on the production of fruit and vegetables (beans, potatoes, and citrus, among others), and where cattle farming is also common.


Figure 5.78: Rainfed agriculture example

Livestock farming is another important activity of the productive base of the study area, where cattle tops the list of predominant livestock. It is considered a complementary resource in areas where agriculture dominates, but it becomes more important as the study area becomes semi-arid with little availability of surface water resources (in the Municipality of Cahama, and especially in Gambos and Curoca). In this area (included in the region of sweet grass pastures), livestock farming is the main, if not exclusive, activity, and agriculture becomes an almost marginal activity, practised only when weather conditions allow and based on less demanding cereal varieties in terms of water requirements, such as massango and massambala.

Livestock farming is mostly practised by individual traditional farmers, to whom the cattle is seen as an economic reserve of their main food, milk, which is consumed by households and, when in excess, sold. The cattle are seldom sold unless families are under great economic pressure or the animals are sick. Livestock farming of small animals is seen as complementary to cattle breeding, and species are sold or exchanged for other products (such as food supplements like cereals). The grazing system applied by these traditional farmers is based on seasonal migration of farmers with their animals over long distances (transhumant grazing), in search of areas with better grazing and water resources and remaining there whilst pasture and water resources allow. Commercial livestock farming is underdeveloped in the study area and is practiced only on large farms under intensive grazing systems.

Figure 5.79: Transhumant grazing

Climate change impacts, such as increasing temperature, increased evaporation, variable rainfall with a shorter more intense season and flash floods, and associated hydrological and geohydrological implications, could have direct consequences for agriculture. Agricultural output in the Cunene river watershed is extremely sensitive to climatic conditions, particularly in the areas with lower rainfall. Periodic droughts cause considerable stock losses and reduce grain production. The uncertainty in future rainfall trends make projection of agricultural impacts very difficult, but certain projections under increased temperatures can be made with confidence, including the following, as relevant to the study area:

- Subsistence agriculture: A decrease in soil moisture and increased inter-annual rainfall variability would result in a greater variability in the yields of crops and would thus decrease food security.
- Livestock farming: With a trend towards greater aridity, a shift towards farming with more small stock and game can be expected. Droughts are also associated with a greater risk of stock poisoning, as stock animals eat unpalatable or toxic plants that are the first to emerge on overgrazed rangelands, in the absence of alternatives. Drought lowers the availability of forage, reduces milk production, growth rates and the health status of livestock. The incidence of tick-borne diseases may increase with increased temperatures, although tsetse fly diseases may decrease.

Impacts on household food security in the subsistence farming areas, is therefore a significant consequence of climate change.

The **industry** in the study area has little representation in the IAI's production base and is mostly located in the city of Lubango (northern sector of the study area). Here there are three main industrial zones: (i) the formal industrial zone, with establishments dedicated to the food and beverage industry, construction, metalworking, wood and furniture; (ii) Boa Viagem industrial zone, with mainly construction industries; and (iii) the Coca Cola complex (beverage industry). A set of small and medium industrial units are also scattered throughout the urban fabric. In the remaining municipalities, and when present, industry is mainly comprised of bakeries. Given the geological potential of the region, the aggregates extraction industry (ornamental rock and construction material) is also present in the study area, focussed within the Municipalities of Chibia, Gambos and Cahama.

Figure 5.80: Examples of extractive industry units

Commerce is beginning to play an important role in the productive structure of the study area. It is mainly practiced informally (in a parallel economy system) in markets, squares, on a roaming basis and/or along the road network. This type of trade is the main means of supplying goods to rural households. Most formal commerce is located in municipal and communal villages, especially wholesale and retail trade.

Informal roadside market

Informal trading post

Municipal market of the commune of Hoque (Municipality of Lubango)

Figure 5.81: Examples of formal and informal trade

In general, **tourism** has great potential in the study area. However, the very limited hotel supply that is primarily concentrated in the city of Lubango, limits the development of this sector.

<u>Employment</u>

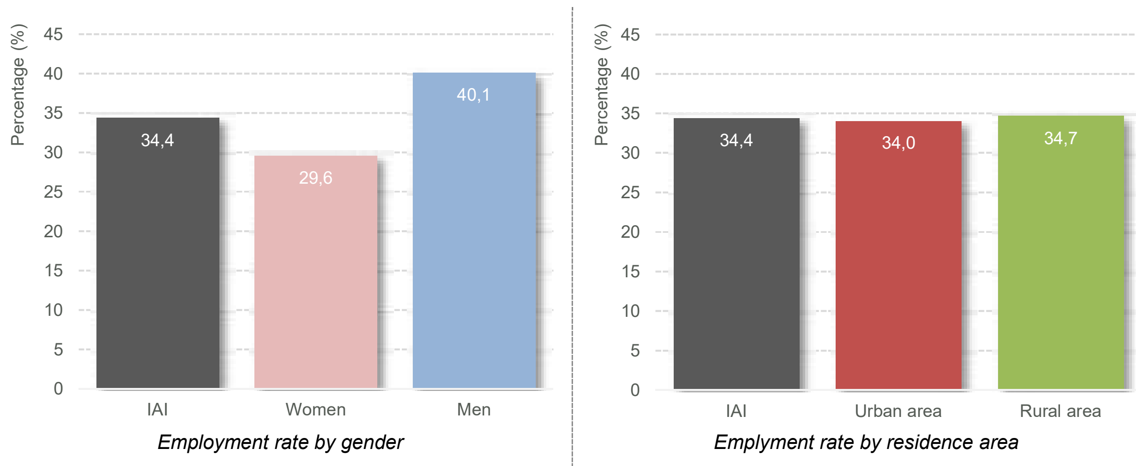
According to the Census 2014, of the total 767 669 inhabitants aged 15 and over within the Constituency, 345 617 were active (i.e. employable/in the labour force), 263 939 of whom were employed and 81 677 unemployed (Table 5.19).

Table 5.19: Activity status of population aged 15 years or older, 2014

Activity status	Total	Female	Male
Population aged 15 years and older	767 669	349 528	418 141
Economically active population	345 617	163 073	182 544
Employed	263 939	123 813	140 126
Unemployed	81 677	39 259	42 418

Source: INE, 2016

On this basis, the employment rate is 34.4%, which is lower than the employment rate of Angola, at 40%. Those who are employed are mostly male (40.1%) and in rural areas (34.7% - Figure 5.82).

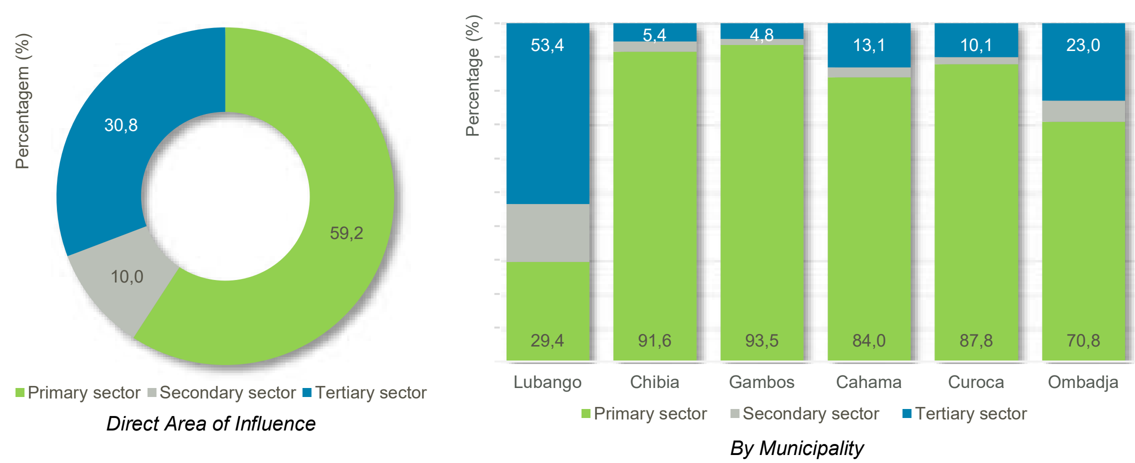


Source: INE, 2014

Figure 5.82: Employment rate, 2014

In 2014, the primary sector employed the largest portion (59.2%) of the labour force, mostly in agriculture and livestock. The primary sector was followed by the tertiary sector (30.8%) and lastly, the secondary sector employed only 10% of the active population (mainly in construction).

This reality is common in practically all municipalities under study, except Lubango, where the tertiary sector absorbs the highest percentage of labour (Figure 5.83).

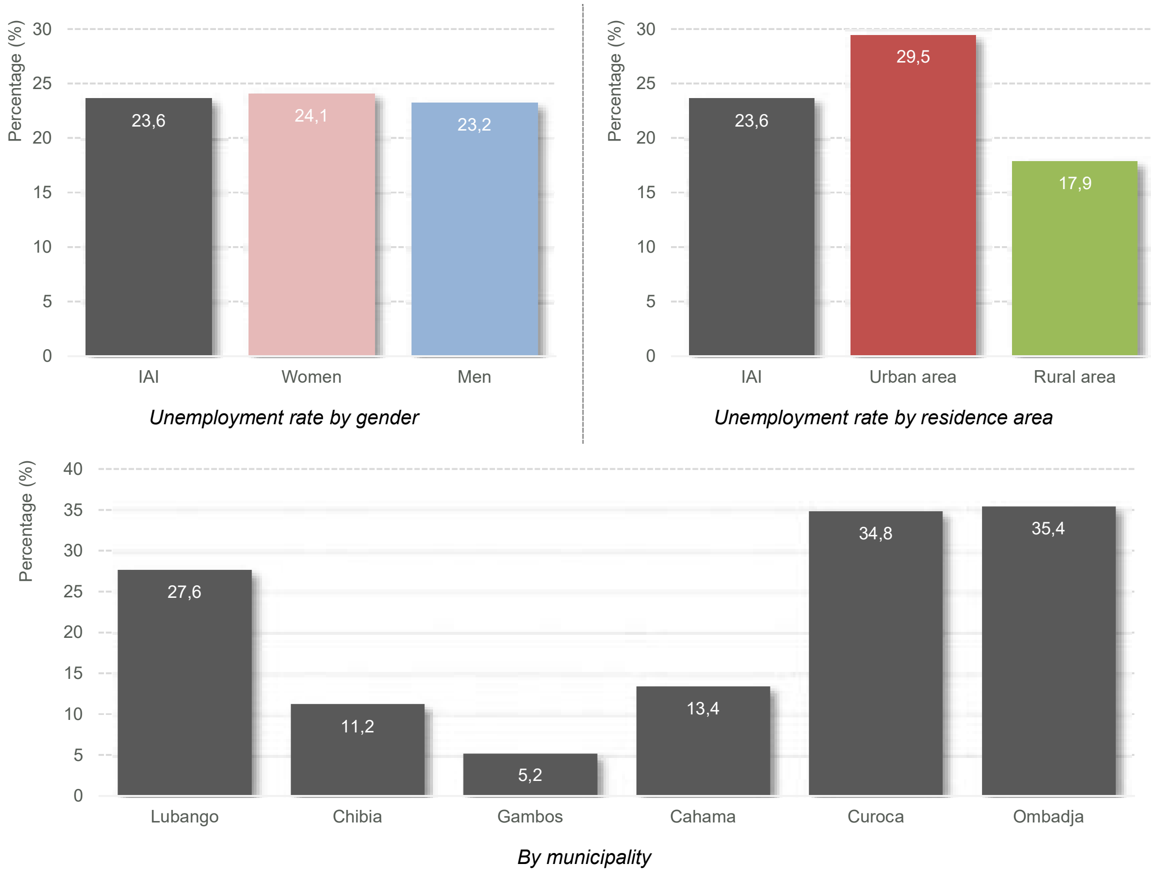


Source: INE, 2014

Figure 5.83: Distribution of employed population by sector of activity, 2014

With reference to Table 5.19, the 81 677 unemployed individuals corresponded to an unemployment rate of 23.6%, which is lower than the country average rate (24.2%), being higher in women (24.1%) and in urban areas (29.5% - Figure 5.84).

In the analysis by Municipality, Lubango, Curoca and Ombadja recorded an unemployment rate higher than the rate for the total IAI (with Ombadja constituting the highest geographical unit - 35.4%). The remaining municipalities outperformed this indicator, far lower than the IAI's unemployment rate, with Gambos Municipality having the lowest unemployment rate (5.2% - Figure 5.84).



Source: INE, 2016

Figure 5.84: Unemployment rate, 2014

5.4.1.2.3 Quality of life

The following table summarises the main indicators of quality of life analysed for the characterisation of the IAI.

Table 5-1: Key indicators of quality of life

Household composition	5.1 people
Habitation	Urban Areas (conventional dwellings) Rural Areas (traditional dwellings)
Households with access to clean water	Total in IAI: 44.3% Urban Areas: 75.1% Rural Areas: 17.8%
Households with access to sanitation	Total in IAI: 35.1% Urban Areas: 46.5% Rural Areas: 1.4%
Households with access to electric power	Total in IAI: 25.3% Urban Areas: 53.4% Rural Areas: 1.2%
Major diseases	Malaria, acute diarrhea, tuberculosis and HIV/AIDS
Average school level	No education level
Multi-dimensional Poverty Index (MPI)	Between 0.402 and 0.420

Source: Field Work, 2019; INE, 2016; OPHI, 2018

Living conditions

According to the Census 2014, a household is composed by an average of 5.1 people (less than the average size of 5.2 people in Angola) and headed mainly by men. Most people in the IAI live in one of two types of housing, varying according to the area of residence (Table 5.20). In urban areas, the predominant housing type tends to be better suited to the type of material used in its construction, i.e. the conventional type (adobe walls and zinc roofing). In rural areas, traditional dwellings predominate, characterised by mud walls and grass roofs.

Table 5.20: Housing by type of material used in construction (%), 2014

Type of material	Total IAI	Area of residence	
Housing (units)	287 849	Urban	Rural
Walls			
Stone	0.1	0.1	0.0
Concrete	6.3	12.4	1.1
Bricks	5.1	10.0	0.8
Adobe	45.0	73.3	20.8
Wood	0.2	0.1	0.3
Tin	1.5	1.9	1.1
Mud walls	41.6	1.8	75.7
Other	0.2	0.3	0.1
Doesn´t know / No answer	0.1	0.1	0.1
Roof			
Concrete	1.3	2.4	0.3
Roof tile	1.2	2.0	0.5
Lusalite/ Fibre cement	2.1	4.2	0.4
Tin	55.5	89.5	26.4
Grass	39.4	1.2	72.1
Other	0.4	0.5	0.3
Doesn´t know / No answer	0.1	0.1	0.1

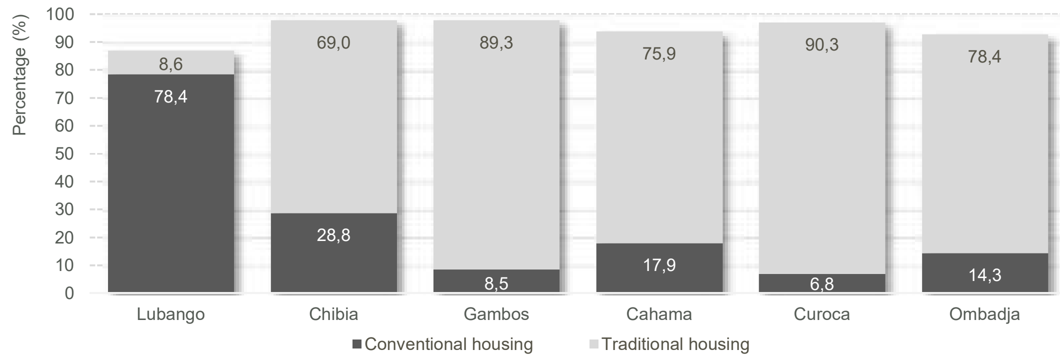
Source: INE, 2016

Typical conventional housing

Typical traditional housing

Figure 5.85: Types of housing

The distribution of housing type by municipality shows that conventional housing is the predominant typology in Lubango, unlike the other municipalities where housing is generally of the traditional type (with particular emphasis on Curoca and Gambos - Figure 5.86).



Source: INE, 2016

Figure 5.86: Types of housing by municipality (%), 2014

The availability of basic services in the households, including access to energy, water and sanitation, was considered. Key indicators for the area (Table 5.21) are summarised as follows:

- The main source of water supply for more than half of the households in the IAI (55.7%) comes from unsafe water sources (unprotected wells, rainwater/*chimpacas* and pond/river/stream). Only 12.5% of households have public water for their consumption (in or outside their home, in the backyard/building or from a neighbour).
- Most households (64.8%) do not have access to sanitation.
- A significant percentage of households do not have access to electricity in their homes (74.7%), confirming the low coverage rate of this service. Where access to electricity is not available (especially in rural areas), lanterns and firewood are the main alternative sources available to households, especially those with lower incomes, for lighting.
- Inequalities between urban and rural areas are evident, demonstrating, as might be expected, that the availability of these services tends to be higher in urban areas, with serious limitations in rural areas.

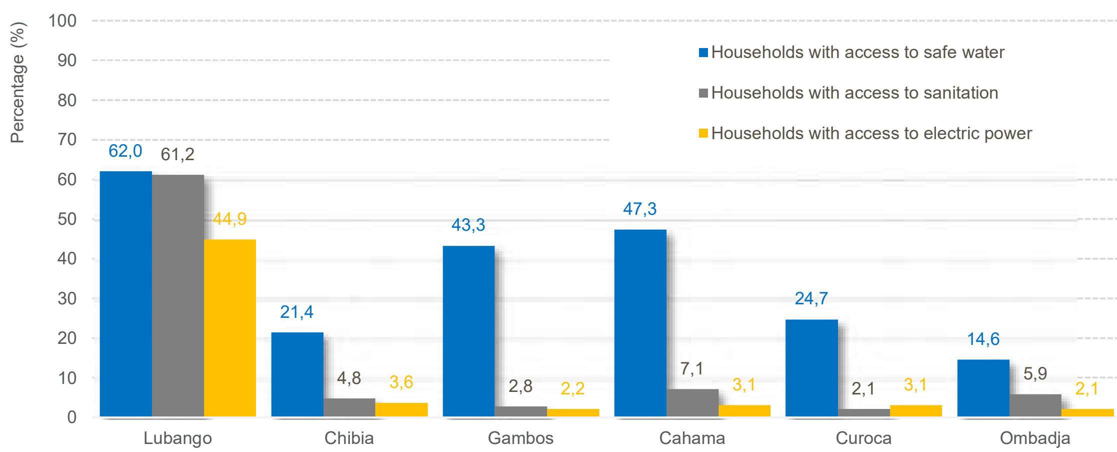
Table 5.21: Housing by availability of basic services (%), 2014

Type of basic services available	Total IAI	Area of residence	
Households (units)	**287 849**	**Urban**	**Rural**
Main source of water supply			
Tap (indoors) connected to the network	7.4	15.0	0.9
Tap (outdoors) connected to the network	5.1	10.7	0.3
Public fountain	8.3	13.3	3.9
Pump borehole	6.6	6.7	6.6
Protected cacimba	16.4	29.0	5.6
Protected spring	0.4	0.4	0.4
Tanker truck	2.9	6.0	0.2
Unprotected cacimba	22.2	14.6	28.7
Unprotected spring	3.0	1.0	4.8
Rainwater	11.6	0.5	21.1
Pond / River / Creek	15.4	1.7	27.1
Other	0.8	1.2	0.3
Households with access to safe water	*44.3*	*75.1*	*17.8*
Households without access to safe water	*55.7*	*24.9*	*82.2*
Main type of sanitary installation			
Indoor toilet connected to sewerage network	1.6	3.3	0.1
Indoor toilet connected to septic tank	17.7	37.0	1.1
Indoor toilet connected to trench/river	0.8	1.6	0.1
Indoor latrine connected to sewerage network	0.1	0.2	0.0
Indoor latrine connected to septic tank	1.8	3.8	0.1
Indoor latrine connected to trench/river	0.3	0.6	0.1
Outdoor toilet connected to sewerage network	0.4	0.9	0.1
Outdoor toilet connected to septic tank	8.8	18.6	0.5
Outdoor toilet connected to trench/river	1.1	2.1	0.2

Type of basic services available	Total IAI	Area of residence	
Households (units)	**287 849**	**Urban**	**Rural**
Outdoor latrine connected to sewerage network	0.1	0.2	0.0
Outdoor latrine connected to septic tank	2.0	4.0	0.2
Outdoor latrine connected to trench/river	0.5	0.8	0.2
Open air	64.8	26.9	97.2
Do not know/ No answer	0.1	0.1	0.1
Households with access to sanitation	*35.1*	*46.5*	*1.4*
Households without access to sanitation	*64.8*	*26.9*	*97.2*
Major source of energy for lighting			
Grid-supplied electricity	25.3	53.4	1.2
Lamp	7.6	10.3	5.3
Candle	4.5	9.0	0.7
Firewood	24.0	0.9	43.7
Power generator	7.1	12.4	2.6
Torch light	31.3	13.7	46.4
Other	0.1	0.1	0.1
Households with access to electric power	*25.3*	*53.4*	*1.2*
Households without access to electric power	*74.7*	*46.6*	*98.8*

Source: INE, 2016

Distribution of basic services by Municipality reveals geographical inequality. In fact, households from Lubango have better housing conditions than the rest of the municipalities. It is also important to note that access to electric power is the service furthest removed from meeting communities' needs (Figure 5.87).



Source: INE, 2016

Figure 5.87: Predominant housing typology by municipality (%), 2014

Access to health

The high death rate in the provinces of the IAI is ongoing, with the number of deaths per 1 000 inhabitants at 10,4% for the Huila Province and 11,6% for the Cunene Province (2014 data, INE).

According to the testimony of local people, water and hygiene-related diseases (malaria, acute dysentery, typhoid fever), infectious diseases (tuberculosis) and Sexually-Transmitted Diseases (STDs - HIV/AIDS) predominate in the epidemiological status of the study area (reflecting the country's profile). The health care network is composed of 151 health units: 1 central hospital, 6 municipal hospitals, 48 health centres/clinics and 96 health stations/rural clinics (Table 5.22). The distribution of the latter reflects unequal access to specific healthcare, in the sense that major health units (hospitals) are only located in municipal headquarters. This implies that the patients who need more intensive care often have to travel long distances to receive proper treatment.

Table 5.22: Network of primary health care centres

Geographical unit	Hospitals		Health centres	Health stations	Total
	Central	Municipal			
Lubango	1	1	20	32	54

Geographical unit	Hospitals		Health centres	Health stations	Total
	Central	Municipal			
Chíbia	0	1	4	8	13
Gambos	0	0	3	15	18
Cahama	0	1	0	10	11
Curoca[1]	0	1	6	10	17
Ombadja	0	2	15	21	38
IAI	1	6	48	96	**151**

[1] *Data from "Plano de Desenvolvimento Provincial do Cunene, 2013"*

Gambos Health centre

Humbe health station (Ombadja Municipality)

Figure 5.88: Examples of health units

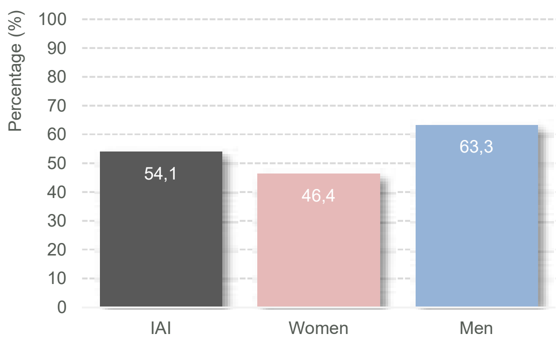
The population per health centre and per health station ratios (Table 5.23) indicates a shortage of primary health care facilities to fulfil the needs of the communities. The most critical situations are found in the Municipalities of Chibia and Lubango: one unit for more than 14 000 inhabitants. According to the interviews of local and traditional authorities (April 2019), besides difficulties of physical access, health care facilities also face challenges due to a lack of medicines and human resources.

Table 5.23: Population per health centre and per health station

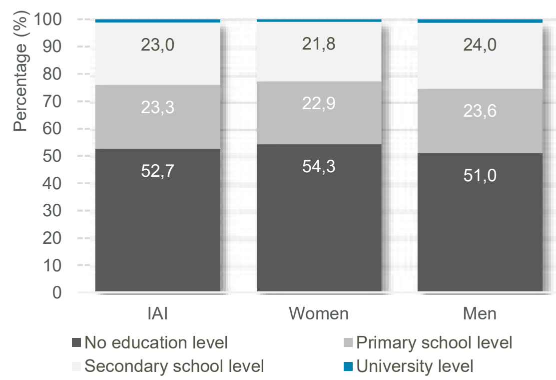
Geographical unit	Health Centres	Health stations	Total
Lubango	38 812	24 258	14 375
Chíbia	47 668	23 834	14 667
Gambos	26 487	5 297	4 415
Cahama	0	7 006	6 369
Curoca	6 848	4 109	2 417
Ombadja	20 331	14 522	8 025
IAI	30 469	15 234	**9 685**

Access to education

Despite its young population, the IAI presents reduced educational patterns. According to the 2014 census, its literacy rate is far below the global literacy rate (more than half of the population over 15 years old can neither read nor write) and education levels remain significantly low (more than half of the population over 5 years old has no form of schooling). Gender analysis indicates a clear disparity between men and women, with the latter revealing a lower literacy and education level (Figure 5.89).



Total and per gender literacy rate



Total and per gender level of schooling

Source: INE, 2016

Figure 5.89: Literacy rate and level of schooling per gender (%), 2014

According to the local and traditional authorities (2019), the current IAI public school network presents a reduced coverage, composed of roughly 622 schools. About 44% of those are located in the northern sector of the study area, in the Municipalities of Lubango and Chibia. The predominant available level of education is primary school. Higher level educational institutes are poorly represented. Secondary schools are mostly found in the municipal headquarters, and university level education is solely offered in Lubango's urban centre (Table 5.24).

Table 5.24: School network

Geographical unit	Primary school level	Secondary school level	University level	Total
Lubango	142	23	3	168
Chíbia	103	11	0	114
Gambos	64	1	0	65
Cahama	77	3	0	80
Curoca[1]	---	---	---	---
Ombadja	190	11	0	201
IAI	576	43	3	628

[1] *Data not available*

Secondary school of Otchinjau (Cahama municipality)

Primary school of Humbe (Ombadja municipality)

Figure 5.90: Examples of schools

Poverty

Although disaggregated information is not available for the IAI, the Multidimensional Poverty Index (MPI) of the province allows an approximate portrayal of the poverty situation of the study area to be extrapolated. This index goes beyond a family income-based perspective, being defined according to ten indicators, each one competing similarly for the three aspects considered, namely health, education and living standards.

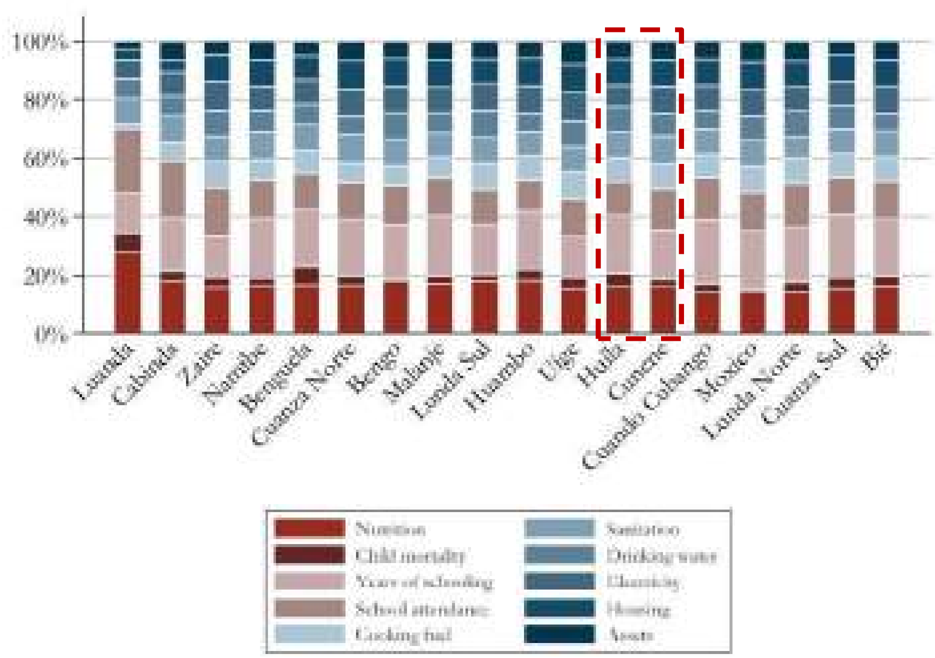
With an MPI of 0,402 and 0,420 (in a scale from "0 – no poverty" to "1 – extreme poverty"), in 2018, Huila and Cunene provinces, respectively, were considered vulnerable to poverty, being two of the worst faring provinces in the country. 68,7% of the population of the province of Huila and 71,9% of the province of Cunene are considered multidimensionally poor, in which 48,1% and 50,8%, respectively, live in severe poverty (Table 5.25).

Table 5.25: Multidimensional Poverty Index (MPI), 2018

Province	MPI	Incidence of poverty (%)	Intensity of deprivation (%)	Severe poverty (%)
Bengo	0,332	62,6	53,1	38,3
Benguela	0,332	59,6	54,1	35,2
Bié	0,475	80,8	58,8	57,9
Cabinda	0,154	31,0	49,6	14,1
Cuando Cubango	0,420	74,7	56,2	50,5
Cuanza Norte	0,330	62,6	52,8	37,3
Cunene	0,420	71,9	58,4	50,8
Huambo	0,376	66,5	56,5	45,4
Huila	0,402	68,7	58,5	48,1
Luanda	0,074	16,0	46,3	6,0
Lunda Norte	0,432	76,2	56,6	51,7
Lunda Sul	0,355	67,8	52,3	43,3
Malanje	0,339	61,3	55,3	39,8
Moxico	0,425	75,9	55,9	51,1
Namibe	0,275	50,0	55,0	31,9
Uíge	0,391	73,2	53,5	47,9
Zaire	0,216	46,4	46,6	21,0

Source: OPHI, 2019

Analysis of the aspects that contribute the most to the calculation of MPI (Figure 5.91) suggests that the biggest factors contributing to poverty are intimately-linked to food consumption and the family's level of schooling: at least one family member suffers from malnutrition and no family member has completed 6 years of schooling.



Source: OPHI, 2019

Figure 5.91: Indicators that contribute to global MPI, per region

5.4.1.2.4 Public utility services

Energy

The low capacity of generation, transmission and distribution of electricity makes it hard for the national supply to meet demand. In specific geographical areas of the IAI, the electricity supply service is unreliable, with recurrent interruptions and, in certain cases, is of a limited duration (i.e. only a few hours a day).

In the northern sector of the study area, only the city of Lubango and the municipal headquarters of Chibia, have power supplied by the Matala hydro-electric power plant as well as by the Lubango and Arimba thermal power plants, all under the responsibility of the "Empresa Pública de Produção de Electricidade" (PRODEL). The Matala hydro-electric facility, located in the Municipality of Matala, operates three generating units with a combined installed capacity of 40.8 MW. The Lubango and Arimba thermal power plants (both located in the Municipality of Lubango) have diesel generator sets and a total installed capacity of 80 MW (40 MW per plant) (PRODEL, 2019).

In the southern sector, the electricity from the electric network only benefits the Xangongo municipal headquarters, being produced at the Xangongo thermal power station (located in the Municipality of Ombadja), with an installed capacity of 5 MW and controlled by the ENDE. Due to their proximity to Namibia, Calueque (Curoca Municipality) and Naulila communal headquarters (Ombadja Municipality) both benefit from electricity from Namibia, produced at the Ruacana hydro-electric power station (located on the Cunene River with an installed capacity of 330 MW), and managed by NamPower.

Matala hydro-electric power facility (http://www.kunene.riverawarenesskit.com, consulted in September 2019)

Ruacana hydro-electric power facility (https://www.nampower.com.na, consulted in May 2019)

Figure 5.92: Examples of hydro-electric power generation facilities

In the remaining municipal and communal headquarters of the study area, access to electricity is guaranteed through a set of generators, under the control of the respective municipal administrations, which is limited to a restricted period at night, usually between 18:00 and 22:00.

Water supply

Where existing, the distribution of water to municipal and communal headquarters is essentially carried out through small community-managed supply systems. The exception to this is city of Lubango, where water is supplied via the water supply system that is managed by the Cunene Water and Sanitation Company. In rural areas, access to water is mainly at public fountains and wells, which have been built and/or rehabilitated under the "Water for All" Program.

Water treatment facility of Quihita (Chibia Municipality)

Water reservoir of Quihita (Chibia Municipality)

Figure 5.93: Examples of water supply infrastructure

5.4.1.2.5 Transport and mobility

The IAI is located at a point where the primary transport infrastructure of southern Angola converges, namely the two national development corridors that ensure external connectivity:

- National Road 280 - EN280 ensures Lubango's connection to with the city of Namibe (Namibe province) and the city of Menongue (Cuando-Cubango province), and which forms part of the Namibe Development Corridor.
- National Road 110 - EN10 enters the northern Municipality of Ombadja from Matala, through Humbe and Xangongo, and ends at the Namibian border. This road is located in the central development corridor.

This network of fundamental axes is linked to the National Road 105 (EN105), which ensures internal connection of the IAI between the Lubango, Chibia, Cahama and Xangongo municipal headquarters. It is also connected to a network of secondary and unsurfaced roads, which provides access for rural villages and farms. In urban areas, motorcycles and cars are the main mode of transport, while in rural areas, mobility of the community (hampered by road conditions which is worse in the rainy season) is mostly by foot and motorcycle.

The IAI also benefits from the Moçâmedes railway, which connects the city of Namibe, in the province of Namibe, to Menongue, in the province of Cuando Cubango, and runs through the city of Lubango. This railway line has been fully rehabilitated and has been operating since 2015.

The IAI also has an international airport, the Lubango International Airport, and an aerodrome in Xangongo. The local airport network also includes a military airport in the Cahama Municipality, which is very well maintained and, in case of emergency, constitutes an alternative to Lubango and Ondjiva airports. A private aerodrome, the Mueka Private Airfield, located in the Municipality of Gamboswas, was also confirmed during the field investigation.

EN105 – National road 105

Secondary road (Cahama – Curoca)

Dirt track

Farm access dirt track

Figure 5.94: Examples of the road network

5.4.1.2.6 Governance model

The local governance model of the IAI, is based on the interaction between local government (exercising state authority power), and the Traditional Authority, which fulfils the role of liaison between the State and the local communities.

Local government is represented by the provincial governments of Huila and Cunene, the municipal administrations of Lubango, Chibia, Gambos, Cahama, Curoca and Ombadja, and their respective communal administrations.

Under Law no.15/16 of 12 September, provincial governments have the responsibility *"…to ensure the fulfilment of the State's functions in the province, based on guidance instruments and actions and the promotion of the harmonious and sustained development of their territory, society and economy. ensure the management and public services necessary for the well-being and safety of citizens*" (Article 11). In turn, the municipal administrations constitute, in accordance with Law no. 17/10, of 29 July, the bodies responsible for the management of the respective municipalities and are responsible for promoting and guiding economic and social development, as well as ensuring the provision of public services in the respective geographical areas. They thus have responsibilities under the municipal development program and its budget, in urban, economic and social development, in agriculture and rural development, in domestic and police law, as well as institutional co-operation. Municipal administrations also have functional powers in the areas of sanitation, and rural and urban equipment. Finally, the communal administrations are responsible for their respective communities in terms of planning and budgeting, sanitation and rural equipment, social and cultural development and institutional co-ordination, while also monitoring and supporting the management and operation of community localities and Traditional Authorities.

The Traditional Authority is represented by a Soba, whose function it is to represent, mobilise and involve communities, while simultaneously mediating, communicating and spreading information, and regulating the relations between municipal and communal administrations. The Sobas are figures of great importance, especially in conflict resolution, and are undoubtedly highly respected by the communities. The Soba "positions" follow a hierarchy, with the Great Soba (Soba Grande) leading the other Sobas (Soba Seculo and Soba adjunto/adjoining Soba).

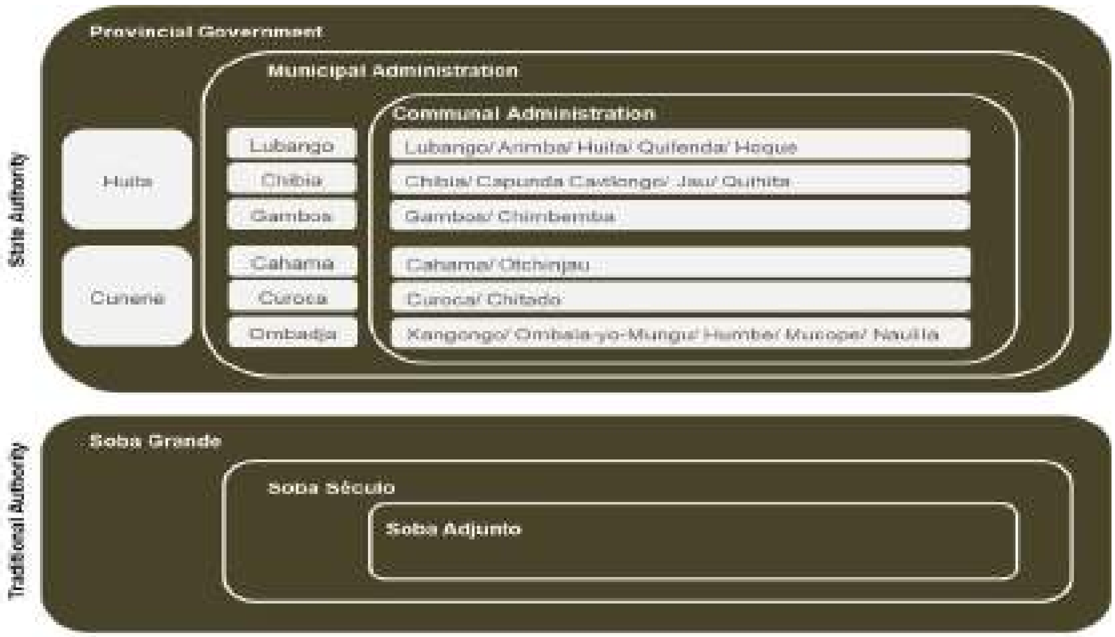


Figure 5.95: Governance model hierarchy

5.4.1.3 Direct area of influence

5.4.1.3.1 General characterisation

The analysis presented in this section is focused on the DAI, which is the geographical area directly affected by the potential impacts of the project. This area comprises a 10 km corridor (5 km to each side of the proposed alignment) which covers part of the following IAI communities: Lubango and Hoque (Lubango Municipality), Capunda Cavilongo and Quihita (Chibia Municipality), Chimbemba (Municipality of Gambos), Cahama and Otchinjau (Cahama Municipality), Chitado (Curoca Municipality), Humbe and Naulila (Ombadja Municipality).

Transport and mobility in the DAI is characterised by an insufficient and precarious road network, which hinders access to various areas and settlements. This road network is mostly composed of dirt roads that tend to be impassable during the rainy season, and communities may be isolated for long periods of time.

The only roads that are surfaced and in reasonable condition are the EN105 (which connects the city of Lubango to the village of Cahama) and the secondary road that connects the village of Cahama to the communal headquarters of Chitado. *In loco*, it was possible to record frequent movements (many of them made on foot), which confirms pastoralism being practised.

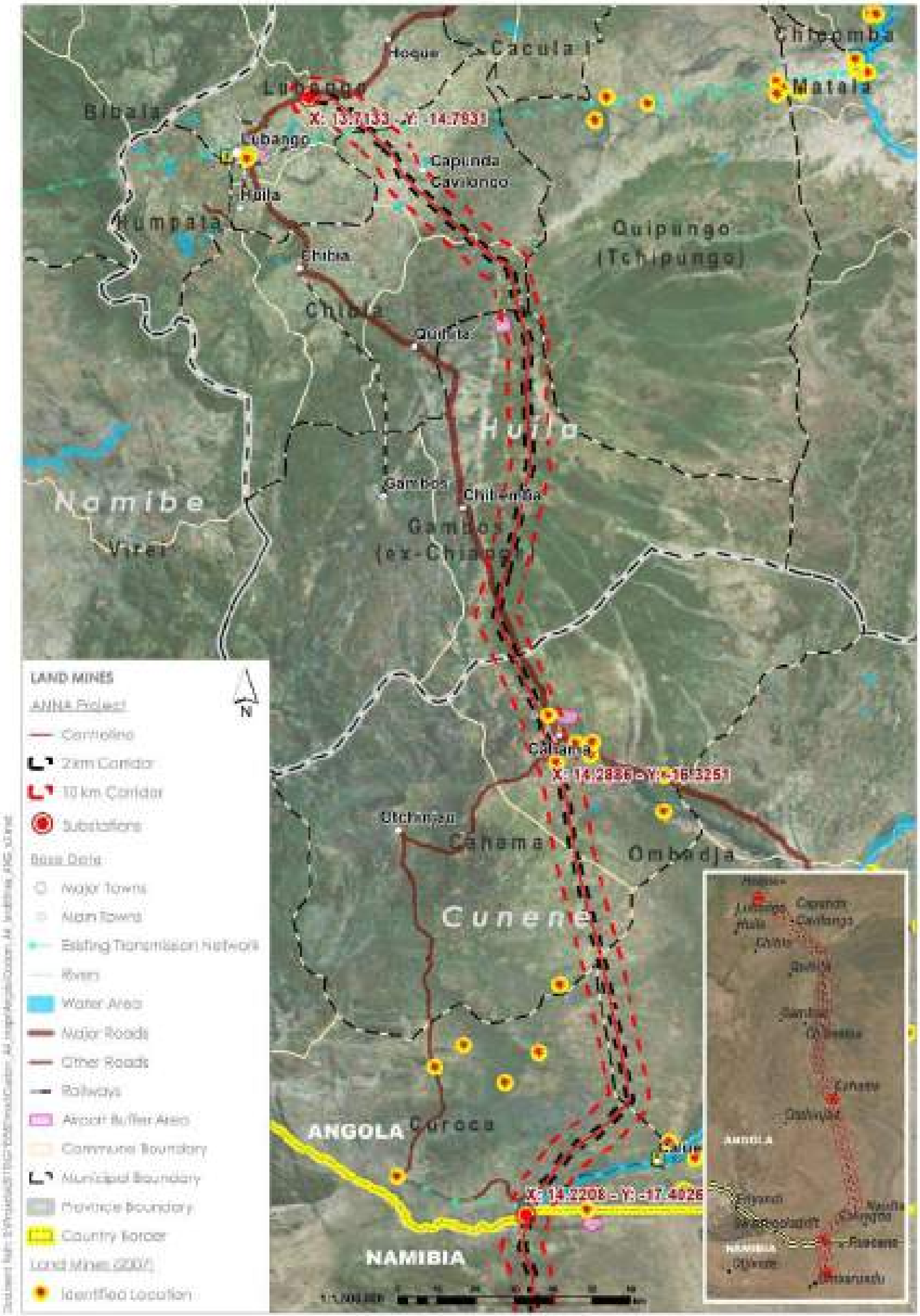
Figure 5.96: Trips along the main roads

Besides the poor condition of the road network, access routes within the study area (especially from the village of Cahama southwards to the Namibian border) may also have landmines present as a result of the armed conflict of the Angolan Civil War. Figure 5.97 indicates the areas affected by landmines that supports a survey undertaken in 2007 which assessed the socio-economic impact of landmines on Angolan communities. This is an additional safety factor that impacts on the mobility of the local population.

According to the Angolan Land Law (Law no. 9/04 of 9 November), all land is state property, being classified as:

- **Grantable land**, which includes urban land (land or rustic building "*located within the formal or enclosed areas of the urban agglomerations and intended for the purpose of occupation and urban building*") and rural land (rustic building *"located outside the urban agglomerations and various types of economic and social development, appropriate to their abilities, or customary occupation regime, namely agrarian purposes, establishment of industrial, commercial or mining facilities, as well as housing occupation"*) (Article 5 of Law no. 9/04 of 9 November ?); and
- **Non-grantable land**, which includes public domain land (water resources, mineral resources, public roads and paths, public bridges and railways, beaches, ports and airports, etc.) and community land (land used by a rural community under a traditional system).

In a major part of the DAI, land is classified as community property, bequeathed primarily by ancestors, and considered not fit for individual ownership. In rural areas, the Sobas have the responsibility to organise and protect community land, to adjudicate land disputes and to allocate land to families or individuals who may not have access to farmland or housing. In urban and peri-urban areas, access to land depends on both the land market and the possibility of land inheritance.



Source: Survey of the Socio-Economic Impact of Land mines in communities (LIS); October 2007

Figure 5.97: Areas affected by landmines, identified in a 2007 survey

5.4.1.3.2 Land use in the DAI

As described in Section 5.2.4.3, a large part of the study area is covered by a mosaic of dense, to open, grassland, croplands and forests. The forest/tree species miombo (*Brachystegia*), is dominant in the central DAI, and is replaced towards the south by stands of mopane (*Colophospermum mopane*), known locally as "Mutiati". When there is less water available, these species give way to savannah-like shrubby plant formations. Between Lubango and Cahama presence of inselbergs (granite rocky hills that emerge sharply from the surrounding plain) is also noteworthy in the landscape.

Forests play a significant social role in the DAI, as they are a source of firewood, which is used in daily activities, and of charcoal which is sold along the main roads. Local communities use the forest as a source of raw materials for construction purposes, livestock feed, as an area for the collection of fruits and wild plants and even for hunting (usually small game), which are all used as subsistence resources (especially in dry periods) and for medicinal purposes. In this region, the forest is also part of an important transhumance corridor that extends from southern Namibia to the province of Huila.

Figure 5.98: Examples of forested landscape

Charcoal production and trade

Transhumance

Figure 5.99: Examples of forest uses

There are few water bodies within the DAI and are mainly represented in the DAI's northern and central sectors by the presence of the intermittent Caculuvar River and its tributaries, and in its southern sector (near the Namibian border) by the presence of the Cunene River. Field studies also identified the occasional presence of some water ponds/"chimpacas" (artificial water reserves usually fed by rainwater). In the remaining territory of the study area, water bodies are almost completely absent and are limited primarily to dry drainage lines.

Like the forest, water bodies play a key role in the survival of local communities, who are dependent on them for their daily activities such as shelter, washing clothes and utensils, and for watering livestock. Additionally, the riparian vegetation is a source of food for cattle. The Caculuvar and Cunene Rivers are also used for non-consumptive purposes, namely artisanal and seasonal fishing which is an additional source of food, nutrition and income.

Caculuvar River

Cunene River

Water course tributary of the Caculuvar River

Dry water course tributary of the Caculuvar River

"Chimpaca"/pond

Figure 5.100: Examples of water bodies

The Ruacana hydro-electric power station is located on the Cunene River, in Namibian territory, but its entrance structures are located within the DAI. During the field work, it was possible to confirm that the availability of water bodies has been decreasing which, in turn, has affected pastures and access to water, resulting in greater pressure on natural resources.

People washing clothes and utensils in the Caculuvar River

Cattle drinking water from a pond (known as "chimpaca")

Selling fish along the Kunene River

Figure 5.101: Examples of water uses

Human settlement (any form of land occupation where people live and practice their livelihoods) is an example of how the geographical environment influences the spatial distribution of communities. Settlement locations are invariably associated with the presence of watercourses, where soils tend to offer better conditions for subsistence farming. The population present in the study area is expected to be mostly of Mumuila origin (from the Nyanekas ethnolinguistic group). However, the potential presence of the two ethnic minorities Mudimba and San further to the south (an area that was unable to be visited during the field work), is not excluded.

The study area has a markedly rural territory and a low occupancy density, although it comprises two geographical areas with different organisational structures and socio-economic dynamics, namely the northern and central sectors (up to the village of Cahama) and the southern sector (from the village of Cahama to the border with Namibia).

The northern and central sectors (up to the village of Cahama) have a higher population density, and communities usually form a concentrated rural settlement. They are mainly engaged in subsistence farming (primarily maize, massambala, beans) on small agricultural land parcels located near their homes. Agriculture is often complemented with livestock farming (mainly cattle) according to a fixed grazing system on the pasture areas surrounding their dwellings. Houses show a mixture of building materials, ranging from wood ("pau-a-pique") and grass, to zinc-coated adobe. Towards the centre of the study area, the scenario changes and houses tend to be made only from wood ("pau-a-pique") and grass, and farms tend to be enclosed with wooden fences.

Houses built of adobe and zinc in the northern portion of the DAI

Housing style known as "pau-a-pique" in the northern portion of the DAI

Agricultural patch surrounded by shrubs in the northern portion of the DAI

Pastures in the northern area of the DAI

Housing style known as "pau-a-pique" in the central area of the DAI

Farm surrounded by shrubs in the central area of the DAI

Figure 5.102: Examples of rural land use in the northern and central areas of the DAI

In the southern area of the study area (from Cahama to the Namibian border), rural settlement is generally sparse, with a considerable extent of land with a low population density. Settlements become more common towards the border. This type of settlement is strongly linked to livestock farming (mainly cattle), which is complemented with subsistence agriculture when the edaphoclimatic conditions allow it (mainly oranges, a very drought-resistant crop, complemented by massambala, a more demanding crop). Rural communities are organised into "family villages" or domestic groups (Adriano Gomes, 2013) living according to the concept of an extended family. These villages (also known as "kimbos", according to information gathered in the field) are generally enclosed with a wooden fence and inner houses are constructed with local materials (using grass and wood). Daily life is centred around the cattle and communities therefore need adequate grazing land, which is soil and climate dependent and poses a challenge in a semi-arid region, with reduced rainfall. As a result, communities practice transhumance and move to the central sector of the study area in search of the best pastures and water resources.

Being dependent on the natural environment, although highly adaptable to adverse environmental conditions, these communities constitute a group that is vulnerable to extreme weather events (such as drought) and to food insecurity.

Housing in the northern area of the DAI (style known as “pau-a-pique”)

Examples of wooden fences around “family villages”

Transhumance of cattle

Figure 5.103: Examples of rural life in the southern area of the DAI, south of the village of Cahama

Most communities have limited access to basic services. They use firewood as their main source of fuel for domestic activities and, in order to obtain water for domestic needs and for livestock watering, they make use of natural water resources, such as water courses and ponds, and any existing water boreholes.

In the areas furthest from the communal headquarters, women (who are responsible for collecting water) often need to travel long distances to obtain water. Sanitation and waste collection services are non-existent. Rural communities have limited access to health and education (health and education networks are insufficient to meet their needs).

The only existing urban settlements in the DAI are the village of Capunda Cavilongo (part of the secondary urban network, located in the northern area) and the village of Cahama (within the primary urban network, located in the central area). These villages are comprised of two types of areas:

- **Urban area** (urban centre) - Consolidated built space, with conventional dwellings, arranged in an organised grid, and structured in blocks. This area is provided with small water supply systems, and most of the population has access to electricity.
- **Peri-urban area** (peripheral area, which may be referred to as suburbs) - Settlement develops in an unorganised, or unplanned, way, constituting an unstructured urban network. In these areas, water is supplied by means of boreholes and access to electricity is more limited.

Existing dwellings

Water reservoir

Fountain and power grid

Figure 5.104: Examples of urban settlements - Capunda Cavilongo village


Dwellings (left: urban area, right: peri-urban area)

Borehole and dwellings

Figure 5.105: Example of urban settlements – Cahama village

Within the DAI there are also large farms (known as "fazendas"), which are large agricultural holdings that have, over the years, alienated the existing communities in their efforts to obtain areas of land with the most beneficial conditions for intensive livestock exploitation (usually acquired through government concessions).

These farms (primarily located in the central area of the DAI) are occupying and cordoning off large tracts of land in the so-called transhumance corridors, thereby denying local communities free access to grazing areas and watering points in the area. This reality is placing considerable pressure on available resources and is particularly severe for traditional communities during extended periods of drought.

Main entrance of a large farm (fazenda)

Fenced farms (fazendas)

Pasture area within a large farm (fazenda)

Water reservoir within a large farm (fazenda)

Figure 5.106: Examples of large farms (fazendas)

Mining/extractive industries, dedicated to the exploitation of ornamental granite, can also be found in the study area. They are mainly scattered through the northern area of the DAI. One of these quarries has been abandoned and it is now used as a dam to water cattle.

Granite quarry

Abandoned quarry with filled with rainwater

Cattle drinking water in the abandoned quarry

Figure 5.107: Examples of extractive/mining industry

5.4.1.3.3 Community expectations

The field research also sought to provide an opportunity for discussions with Local and Traditional Authorities and to gather their concerns and expectations regarding the project. The parties who were interviewed engaged actively but were not accustomed to such projects. An overall positive attitude towards the project was confirmed, provided that some key issues were safeguarded:

- **Involvement:** Communities should be consulted when project decisions involving the allocation of land uses are taken. Lack of access to electricity is a significant problem in the study area and it is therefore essential to clearly communicate which areas will benefit directly from project implementation and which areas will benefit indirectly from the expansion of the national electrical grid.
- **Compensation:** In areas that will not benefit directly from the project, the parties consulted consider it important to compensate for the presence of such large infrastructure. The type of compensation best suited to their needs is access to electricity (e.g. small-scale solar systems) but, above all, the lack of water is the main concern. The construction of water points (to both the population and livestock), is therefore considered as fundamental.
- **Communication:** The understanding of the problems and challenges of rural communities that provincial and municipal administrations have, differs greatly from the perceptions of the communities themselves. Administrative bodies seem to have a vague and unclear knowledge of the difficulties that people in remote areas face, and these communities feel isolated. It is therefore

difficult to access and share information. Meetings/conversations with communities are the preferred means of communication, rather than written content. These meetings should be convened directly with the Traditional Authority.

- **Land use**: Although there is no obvious conflict between farmers and traditional shepherds, the transhumance areas occupied by the farms are a concern. The project should therefore not exert further pressure on these transhumance areas.

5.4.2 Archaeological and cultural heritage

5.4.2.1 Technical scope of the Heritage Impact Assessment

The objectives of the Heritage Impact Assessment (HIA) is to deliver, evaluate and inform on the following aspects:

- The identification and mapping of all heritage resources in the affected area;
- An assessment of the significance of such resources in terms of the heritage assessment criteria set out in the relevant legal descriptions, the development Proponent's requirements, and as per international best practice approaches and charters;
- An assessment of the impact of the development on such heritage resources;
- An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- The results of consultation with communities affected by the proposed development, and other interested parties, regarding the impact of the development on heritage resources;
- Whether heritage resources will be adversely affected by the proposed development, and the consideration of alternatives; and
- Plans for mitigation of any adverse effects during, and after, the completion of the proposed project.

The following categories of heritage objects have been considered.

Graves

A place of interment that includes the contents, headstone or other marker of, and any other structures on or associated with, such a place. This may include any of the following:

- Ancestral graves;
- Royal graves and graves of traditional leaders;
- Graves of victims of conflict, i.e. graves of important individuals;
- Historical graves and cemeteries older than 60 years; and
- Other human remains, buried or otherwise.

The removal of graves is subject to the following procedures:

- Notification of the impending removals (using local language media and notices at the grave site).
- Consultation with individuals or communities related, or known, to the deceased.
- Satisfactory arrangements for the curation of human remains and/or headstones in a museum, where applicable.
- Procurement of a permit from the relevant controlling body.
- Appropriate arrangements for the exhumation (preferably by a suitably-trained archaeologist) and re-interment (sometimes by a registered undertaker, in a formally proclaimed cemetery).
- Observation of rituals or ceremonies required by the families.

Movable objects

This includes objects such as historic, or rare, books and manuscripts, paintings, drawings, sculptures, statuettes and carvings; modern or historic religious items; historic costumes, jewellery and textiles; fragments of monuments or historic buildings; archaeological material; and natural history collections such as shells, flora, or minerals, as well as objects recovered from the soil or water including archaeological and paleontological objects and material, meteorites and rare geological specimens. Further examples of movable objects include:

- Ethnographic art and objects;
- Military objects;
- Objects of decorative art;
- Objects of fine art;
- Objects of scientific or technological interest;
- Books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings; and
- Any other prescribed categories, but excluding any object made by a living person.

Discoveries, and related access thereto as a result of a project, may increase the vulnerability of cultural objects to theft, trafficking or abuse.

Battlefields

Those older than 75 years.

Heritage "places"

A 'place' is defined as:

- A site, area or region;
- A building or other structure (which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure);
- A group of buildings or other structures (which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures);
- An open space, including a public square, street or park and, in relation to the management of a place, includes the immediate surroundings of a place; and
- Traditional buildings used in cultural ceremonies.

Heritage structures

These refer to single, or groups of, architectural works found in urban or rural settings that provide evidence of a particular civilisation, a significant development or an historic event. It includes groups of buildings, structures and open spaces constituting past or contemporary human settlements that are recognised as cohesive and valuable from an architectural, aesthetic, spiritual or socio-cultural perspective.

It means any building, works, device, or other facility made by people, and which is fixed to land and any fixtures, fittings and equipment associated therewith and older than 60 years.

Archaeological sites

These are any combination of structural remains, artefacts, human or ecological elements, and may be located entirely beneath, partially above, or entirely above, the land or water surface. Archaeological material may be found anywhere on the earth's surface, singly, or scattered over large areas. Such material includes burial areas, human remains, artefacts and fossils. Archaeological sites may include:

- Material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;

- Rock art, being a form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years, including any area within 10 m of such representation;
- Wrecks, being any vessel or aircraft, or any part thereof, which was wrecked, whether on land or in the maritime cultural zone, and any cargo, debris or artefacts found or associated therewith, which are older than 60 years or which, in terms of national legislation, are considered to be worthy of conservation; and
- Features, structures and artefacts associated with military history that are older than 75 years, and includes the sites on which they are found.

Paleontological resources

Refers to any fossilised remains or fossil traces of animals or plants that lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or traces.

Sacred or spiritual sites

Natural Features with cultural significance, including sacred hills, mountains, landscapes, streams, rivers, waterfalls, caves and rocks; sacred trees or plants, groves and forests; carvings or paintings on exposed rock faces or in caves; and paleontological deposits of early human, animal or fossilised remains. This heritage may have significance to local community groups or minority populations.

5.4.2.2 Geographical and spatial scope

The geographic and spatial scope of the HIA centres around the 2 km corridor of the proposed alignment, as the DAI, as well as the 5 km corridor, as the IAI. Any sites within the 5 km corridor can be affected by the proposed development and were included, where known, in this report. Mitigation or secondary investigations adopt this corridor as the spatial parameters of the study area.

The proposed project will consist of three phases: Construction, Operation and Decommissioning. Due to the nature of the proposed development, impacts on heritage sites are only anticipated to occur during the construction phase. The operational phase will not result in any further alterations to heritage resources on any significant scale and, at present, there is no defined decommissioning phase.

5.4.2.3 Methodology

5.4.2.3.1 Site visit / Fieldwork details

Fieldwork for the Angolan and Namibian components was undertaken in succession between 12 and 18 April 2019. Fieldwork was executed in conjunction with the social impact assessment specialists. Each group included a division of the Angolan Military’s Demining Division. The military escort provided security and assistance to identify areas with a potential risk of landmines. On several occasions they also proved invaluable in communicating with the local population.

Several factors affected efficacy of the fieldwork. These included the sheer size of the corridor (at over 4 000 km^2) as well as a lack of access, even in areas where the corridor could be safely accessed in terms of landmine risk.

The first two days were spent surveying the areas to the north of Cahama village, while the subsequent three days were utilised to investigate areas to the south of this village.

To increase the resolution of the survey, permission was requested from the military and the Cahama regional management, for the use of photographic drone fly-overs. Unfortunately, this permission was only granted before the last day of the Angolan survey and, as a result, this resource was of little assistance.

5.4.2.3.2 Consultations

Due to language restrictions, community consultations and discussions were combined with the fieldwork of the social impact assessment specialists and the environmental project manager.

The results of these consultations were limited to comments on graves and burial sites and the traditions, or lack thereof, regarding reburials. Community consultations resulted in the identification of one ceremonial site outside of the village of Cahama. This was referred to as the "*Pedra Sagrada Vermelha"* and consisted of a large red stone used as a ceremonial site, especially during the local rainmaking ceremonies.

5.4.2.3.3 Gaps / Limitations / Uncertainty

The main limitation for this study was the lack of accessibility in the study corridor. It is calculated that probably less than 1% of the proposed 5 km corridor could physically be investigated. Thus, the study focussed on approach development and the extrapolation of heritage attributes, to expected occurrences and the subsequent impacts and possible mitigation thereof. The study is significantly more complex and unique than the usual HIA studies. The goal of the study changed from "what to" to "what if" and recommendations are more proactive in nature than reactive.

Very little archival information is available on any aspect of the heritage resources of the affected environment. This compounded the uncertainty of what could be expected to be found and what to look for.

Due to concerns regarding safety, the military escort limited the team's investigative ability to a large extent. The vast areas and poor roads meant that the team had to travel at high speeds through the accessible areas of the corridor and, where there were stops, nobody was allowed to venture far from the road.

A large component of successful identification of heritage sites and objects, is direct observation. Human nature is unpredictable and does not regularly follow set guidelines and parameters. As a result, it is exceedingly difficult to postulate the occurrence of heritage sites within a specific area based on set rules. In other fields such as ecology and geology, certain rules apply that make the occurrence of specific species or geological deposits highly likely when a group of rules is applied to an area. The same does not hold true for human occupation. Humans do not function as a species, but as individuals, and therefore are unpredictable in movements and actions. This makes extrapolation of information highly uncertain and direct observation is imperative.

Initially, areas of interest were identified within the corridor for which LiDAR imagery was available (Figure 5.108, Figure 5.109 and Figure 5.110), with the intention of performing ground-truthing during the fieldwork phase. However, it quickly became apparent that this strategy was not optimal, since access to these areas was restricted due to the risk of landmines and the Unexploded Ordinance (UXO). After day one, this strategy was abandoned, leading to a great deal of uncertainty as to the execution and direction of the fieldwork.

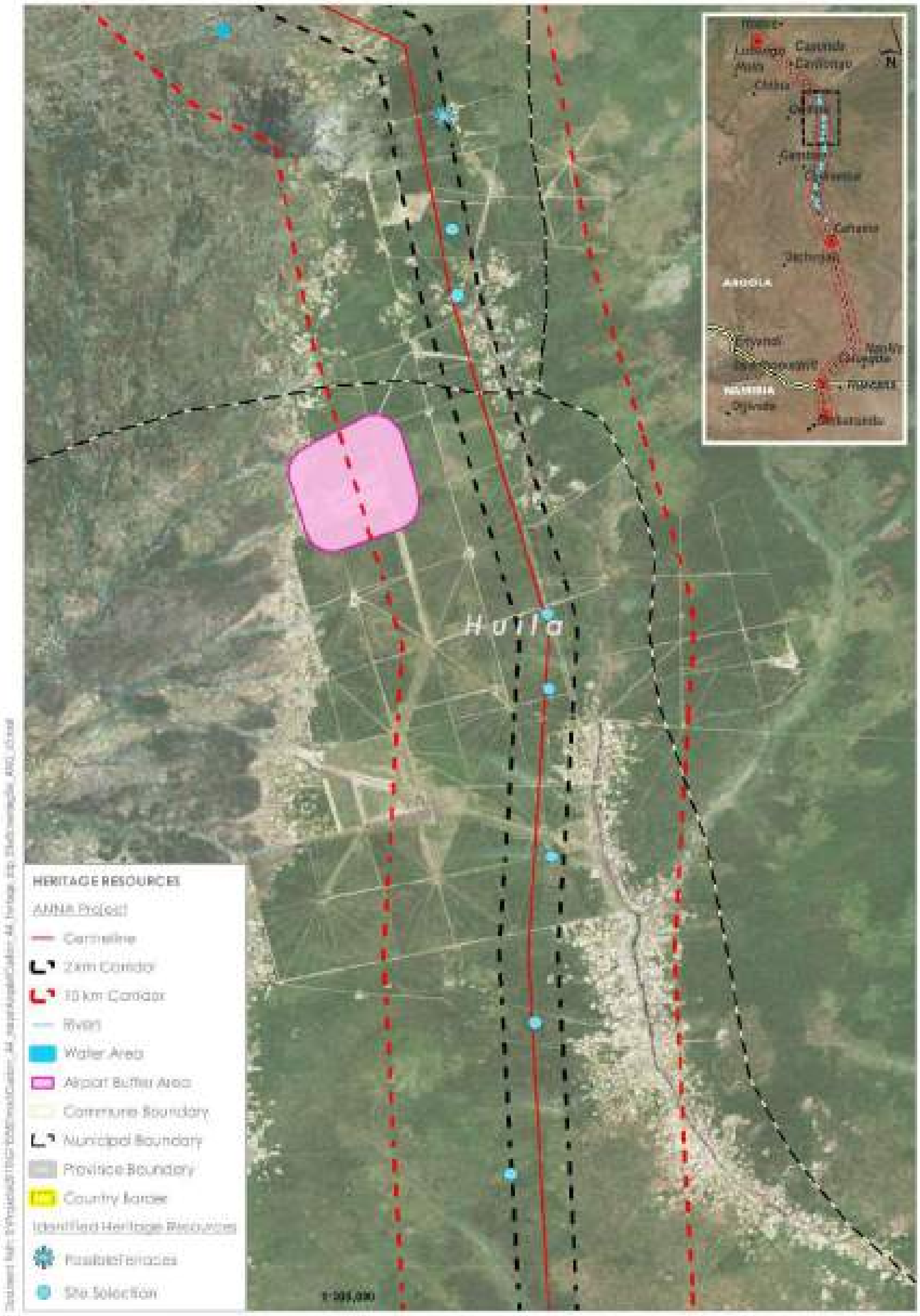


Figure 5.108: Heritage resources site screening and selection (1)

Figure 5.109: Heritage resources site screening and selection (2)

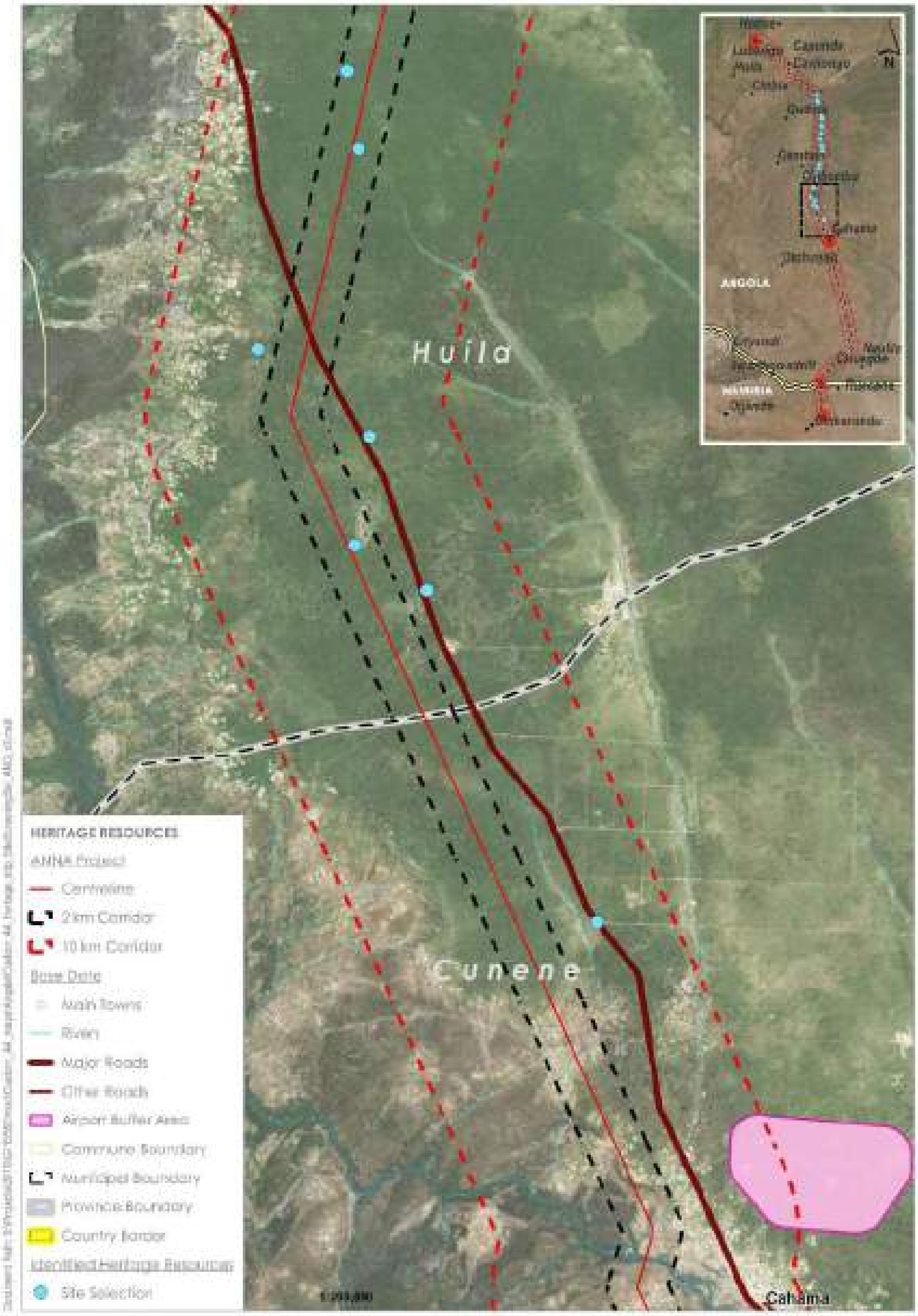


Figure 5.110: Heritage resources site screening and selection (3)

5.4.2.4 Baseline / Historical context

5.4.2.4.1 Palaeontology

The palaeontology of Angola has received slightly more attention than its archaeological record, mainly as a spin-off from the geological investigations, driven by the energy and mining sectors, especially the petroleum industry. Although some areas, such as the diamond-bearing regions, have detailed geological maps, there is no comprehensive geological map of the whole country.

From the assessment made in Section 5.2.2.2, related to local geology (Figure 5.33), it can be observed that the ANNA corridor project runs primarily through sedimentary alluvial deposits, although some of these are underlain by Pleistocene deposits. Small sections of the corridor traverses *Paleoarchean*, *Mesoarchean* and *Mesoproterozoic* deposits.

Angola has recently been the centre of attention within the palaeontological world with the discovery of very rich fossiliferous *Cretaceous* deposits along its south-western coastline. This area has also seen the discovery of the agreeably named *Cretaceous* Mosasaur *Angolasaurus,* and its much bigger and later compatriot *Angolatitan, Angolasaurus bocagei*, recovered only from the *Tadi Beds Formation*, and sharing its habitat with the *tylosaurine* species *Tylosaurus* (formerly Mosasaurus*) iembeensis* and the shallow-water turtle *Angolachelys*. Indeterminate *halisaurine* and *plesiosaur* remains have also been recovered from this region. However, none of these formations of geological eras are located close to the proposed corridor.

Of particular interest to this study (although not within the IAI), is the discovery of hominid remains in the 1940s, 1960s and 1990s, at the Leba Caves, which have been used commercially for the mining of limestone since the early 1940s, approximately 20 km west of Lubango. The palaeontologist Dr. Raymond Dart reported on a possible find of several hominid skulls here as early as the 1950s.

Source: R. Dart 1950

Figure 5.111: Leba Cave deposits

Source:E.C. Minkoff, 1972

Figure 5.112: Leba Cave skull

5.4.2.4.2 Stone Age archaeology

The area which is now known as Angola was first inhabited about 25 000 years ago. Although not much is known of the people who lived in the north, there is more information available for the southern Angolan inhabitants. These people were called the Khwe and were part of the Khoe language group. Research has shown that the Khwe people developed as a distinctive group approximately 2 000 years ago and are estimated to have adopted a pastoralist existence somewhere between 1 000 Before the Common Era (BCE) and 500 BCE. The Khoe people were a fairly isolated group.

Much of the information we have today can be attributed to the 1960s work of Desmond Clark in Angola. Clark shows that after the beginning of the Late Pleistocene (126 000 +/- 5 000 YBP), three distinct cultural zones began to appear in Angola. The earlier Stone Age populations tended to live on the edges of the humid forest country. In the middle and later Stone Age, a tripartite cultural variability is found with a Lumpemban and Tshitolian tradition using core axes and projectiles in the Congo Basin. Stillbay/Pietersburg and later, Wilton, toolmakers lived in the Zambezi basin, while desert industries of broadly Namibian type is found in the southern arid regions.

The above is a very short synopsis of the Stone Age of Angola. The well-known archaeologist and celebrated author Brian Fagan comments on the work of Clark and states the following: "…*But Clark's preliminary surveys serves to show the enormous gaps in the archaeological record awaiting investigation by survey and excavation. Angola was one of the most important areas of prehistoric Africa and as such merits more attention from archaeologists than it has hitherto received*…" (Fagan, B. 1966).

During fieldwork in July and August 1971, G. D. Gibson collected a few hundred Middle Stone Age (MSA) artefacts in the immediate vicinity of the Munhino Mission, Huila Province, Angola. Although this sample consists entirely of disturbed surface remains, it is of some interest since it represents, to the best of our knowledge, by far the largest collection of MSA material from south-western Angola. Gibson states" *…With the possible exception of Humpata Cave (Franga 1964), we are not aware that any such assemblage has been uncovered in a sealed stratigraphic context, and for this reason the MSA of south-western Angola remains very poorly understood. The abundant surface remains around the Munhino Mission suggest that a systematic survey of this region might prove rewarding…"* (Gibson, G.D. 1971)

From the above, it is obvious that a verdict regarding the heritage sensitivity in terms of Stone Age deposits of any area in Angola, cannot be based on the scant information available at present.

On two occasions, Middle to Late Stone Age Tools and Cores were noticed in the IAI. One was at Calovango, and another further south. None of these were, however, representative of a defined Stone Age occupational or manufacturing site, although they still may occur in the DAI.

5.4.2.4.3 Iron Age archaeology

Although there is much detailed work still to be done, for which relevant oral information survives surprisingly well, a large but poorly-detailed canvas of the Angolan Iron Age can be drawn at this time. At Kalunga, for instance, in the very heart of the old slave territory, traditional iron-working techniques are well remembered, and smelting without the use of a furnace has probably been practised within the last 100 years. The failure of Kimbundu-speakers to evolve efficient iron-producing methods (despite the importance that their political myths attach to iron) may be an indication of unusual cultural isolation, which needs investigation. In the nineteenth century, many Kimbundu (and indeed many Portuguese) were dependent for their farming implements on an immigrant class of Vili ironmasters from north of the Congo River. The topic of iron-working, like that of salt-making and copper-mining, provides a field where archaeology can support early investigations of economic history.

After 1 000 CE, several centralised states were formed by various Bantu-speaking groups in the northern and central regions of present-day Angola, and it was during this time that a system of lineage groups called the Ngola, arose. The name of the country also originates from the word Ngola, which was an iron ore object that symbolised kingship among the Mbundu and Lunda people (and today is also the name of a beer produced in Lubango). (Miller, J. 1976)

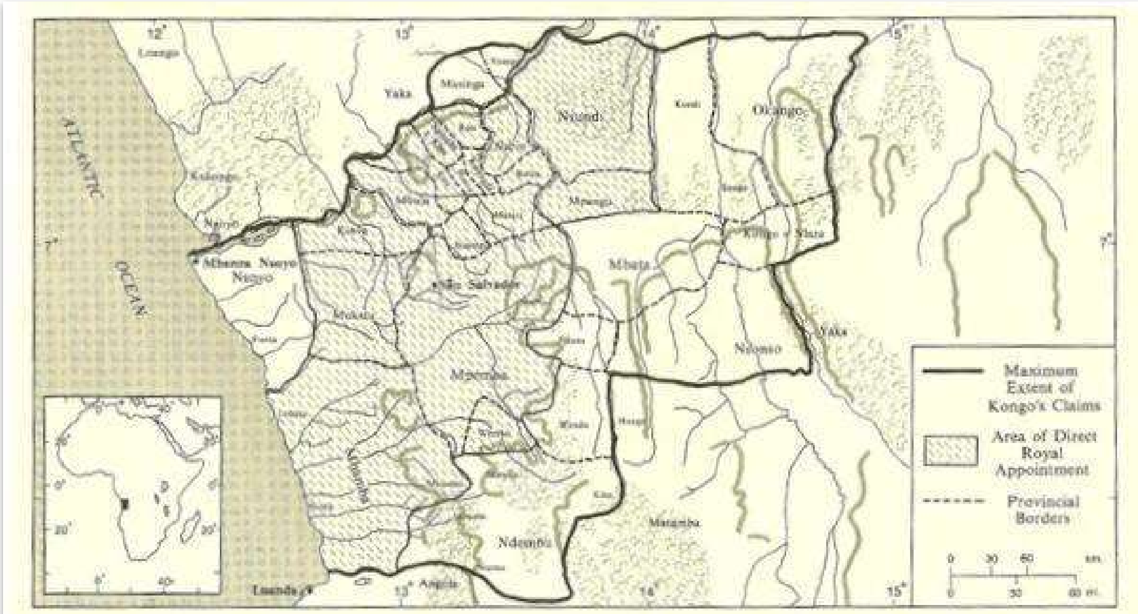
No Iron Age sites were documented along the study corridor during the fieldwork sessions. However, the background study and isolated pottery remains suggest that these types of heritage sites will certainly be present in other areas of the corridor.

5.4.2.4.4 Historical period: Pre-colonial to colonial times

The Kingdom of Kongo

The Kingdom of Kongo is the most famous and expansive of the kingdoms, formed in northern Angola by the Bakongo-speaking people in approximately 1390 around the present-day town of M'banza-Kongo. The first meeting of Portuguese explorers and King Nzinga of the Kingdom of Kongo is recorded to have been in 1482.

The export of slaves was central to Kongo, maintaining their relationship with the Portuguese. While slavery existed before the coming of the Portuguese, it took on a much larger and brutal scale subsequently.



Source: Franga, 1964

Figure 5.113: The Kingdon of Kongo in 1641

In 1593 a civil war broke out between the Kongo and the Soyo, and the Soyo declared its independence under Count Daniel da Silva in 1641. In 1665, the Portuguese invaded the Kingdom of Kongo and the two states fought in the Battle of Mvwila. The Kongolese forces and their King (Antonio I of Kongo) was killed by the Portuguese soldiers, who seized the island of Luanda. In 1670, despite having fought against each other five years earlier, a joint Portuguese and Kongolese force invaded Soyo and were, in turn, defeated by the Soyo forces. The 17th century saw the emergence of clans who would come together to elect their Kings. During the Berlin Conference of 1884-1885, the European powers decided that Portugal would take most of what remained of the Kingdom of Kongo and Belgium would take the rest. For Portugal to claim their area, they would also have to occupy it. An opportunity for the occupation arose in 1883, when King Pedro V, of the Kingdom of Kongo, was fighting a rival faction lead by Alvaro XIII. Pedro V invited the Portuguese into an alliance, and in return, Portugal would station soldiers in São Salvador. This allowed the Portuguese to effectively take control of the capital in 1888. This ended the independence of the Kingdom of Kongo and, by the early 1900s, the Kingdom had been integrated into the Portuguese colony of Angola. (Thornton, 1983)

The Mbundu Kingdom of Ndongo

The Kingdom of Ndongo was established by the Mbundu people, who occupied large areas of present-day Angola. The Kingdom was ruled by the Ngola. At its height, it was one of the largest states in central Africa. It was, however, smaller than the Kingdom of Kongo.

Between 1560 and 1579, Portugal sent several missionaries to the Ndongo in attempts to set up the Catholic Church in the Kingdom. In 1575 the Portuguese set up their first modern colony in Ngongo, which would later become the colony of Angola. From 1575 to 1663 Portugal was in constant war with the Kingdom of Ndongo in an effort to conquer more land and to acquire slaves. It is during this time that Queen Njinga Mbandi Ana de Sousa of Ndongo ruled the Kingdom. She personally led many of the battles against the Portuguese between 1626 and 1665.

During the war between the Dutch and the Portuguese, both the Kingdoms of Kongo and Ndongo allied with the Dutch in an effort to drive the Portuguese out of Angola. Queen Njinga negotiated a peace treaty with the Portuguese through a series of letter exchanges between 1655 and 1663, the year in which she died of natural causes, but, in 1671, the Portuguese and the Kingdom of Ndongo waged war again. On

29 November 1671, the Portuguese captured the fortress Pungu-a-Ndongo. This effectively ended the territorial integrity of the Kingdom and it was integrated into the Colony of Angola. (Candido, 2013)

The Portuguese Colony of Angola

The colonial conquest of the Portuguese in Angola began with the missionaries in the Kingdom of Kongo in the 1490s and the establishment of the colony in Luanda in 1575. Their initial pursuit was the slave trade, from the harbour of Luanda and the other large colonial hub, Benguela (established in 1671). The slave trade would eventually lead to the destabilisation and demise of the Kingdoms of pre-colonial Angola.

While the transatlantic slave trade was made illegal in 1836, it was still legal to own slaves until 1875. However, in many places, various forms of slavery continued well into the 1900s.

By the 1920s there were approximately 20 000 European settlers living in Angola. After 1926, Angola began to create legislation to advocate strict segregation between Europeans and African people. That year, the “native statute” was introduced to divide all people into one of two groups, either “natives” or “citizens”. People categorized as “natives” had to pay a poll tax (previously called a “hut tax”) and were liable to be conscripted into forced labour. To become a citizen, a person had to prove to the colonial authorities that they were monogamous, spoke fluent Portuguese and wore European clothes. Subsequently, a black and white racial divide would increasingly become the norm (Thornton, 1984)

5.4.2.4.5 Angolan revolution and civil war

The Angolan Revolution

On 4 February 1961 a large group of Angolan people stormed several prisons in Luanda. The uprisings in Luanda and in the north became the catalyst for the Angolan national revolution to free the Angolan people from Portuguese rule.

It is debated between historians whether the rebellion was a spontaneous uprising or directed by the People’s Movement for the Liberation of Angola (MPLA), which later become the National Front for the Liberation of Angola (FNLA). The leader of the FNLA, Holden Roberto, established the Angola’s Revolutionary Government in Exile (GRAE) political party, in an attempt at making his party the representative for the Angolan liberation struggle. Jonas Savimbi was one of the prominent ministers in the GRAE but broke away from the party in 1964, assuming the head of another political party, the National Union for the Total Independence of Angola (UNITA), in 1966. These three parties established themselves internationally as the primary forces of the national revolution for independence.

The Angolan struggle for independence was met with severe retaliation from the Portuguese government. By 1974 there were approximately 70 000 Portuguese soldiers fighting in Angola. The royalties on oil extracted by Texan oil companies helped fund, to a large degree, the Portuguese armed presence in Angola. South Africa and the United States of America supplied the Portuguese with materials and weapons of war, while the MPLA drew assistance from the Soviet Union and Cuba.

In August 1973, the Armed Forces Movement (MFA) was founded in Portugal. The MFA ousted the Portuguese government of Angola in a coup on 25 April 1974 and, in July of the same year, they promised independence to the colonies of Mozambique, Guinea-Bissau and Angola.

The plan was for an interim government, comprised of UNITA, FNLA, MPLA and the Portuguese, to lead Angola until the elections in October 1975 but, in June/July of that year, old conflicts between the parties re-emerged. All three parties mobilised their military wings and fighting ensued in Luanda. The FNLA and UNITA were forced to flee the city.

UNITA allied with South Africa and declared that they would fight the “new colonial oppression” of Cuba and the Soviet Union. The MPLA’s southward advance was halted in September 1975 just as they reached the old kingdoms of Bihé and Huambo, which were UNITA strongholds. While the fighting continued, the Portuguese government left Angola on 11 November 1975, and Agostinho Neto, the first President and leader of the MPLA, proclaimed the establishment of the People’s Republic of Angola.

In 1976, after the FNLA was driven out of the country, MPLA and UNITA had set up distinct areas which they controlled. The MPLA occupied the northern and western parts of the country, including the urban areas, while UNITA ensconced themselves in the southern and eastern highlands. In support of UNITA, South Africa sent approximately 6 000 soldiers over the border to aid in securing the city of Huambo, which was to become UNITA's alternative Angolan capital. The Soviet Union in turn sent massive aid to the MPLA in the order of USD400 million, to arm their soldiers. Concurrently, time the MPLA was trying to set up a post-colonial government but was weakened by the multitude of factions in the party and thus struggled to live up to expectations and, in 1977, poor and working-class people launched a coup under the leadership of Nito Alves against President Neto. The rebellion was brutally suppressed and the majority of the leadership, including Alves, was executed. Thousands of civilians were killed by forces aligned with the ruling regime, and the attempted coup made the MPLA increasingly authoritarian. It abandoned the egalitarian model in favour of a more dictatorial approach (Thornton, 1999).

In 1976, the MPLA openly announced its support for the South-West Africa People's Organization (SWAPO), who were fighting the apartheid regime in the then South West Africa (now Namibia). This caused the South African government to increase its support to UNITA. In 1985, the MPLA and its Cuban allies made a major push towards Huambo but, with the help of the South African Defence Force (SADF), UNITA managed to hold on to its capital. In 1986, the USA resumed its support for UNITA. After another failed attempt in 1987 by the MPLA to take over Huambo, its forces were driven back to the city of Cuito Cuanavale. The Cubans sent in more forces to defend the city and the battle of Cuito Cuanavale turned into a siege in 1988, with neither side winning.

On 22 December 1988, Cuba, South Africa and Angola signed the Tripartite Accord at the United Nations headquarters in New York, granting Namibia independence from South Africa and ending the involvement of foreign troops in Angola. The lack of foreign support forced the MPLA and UNITA to negotiate a treaty and thus, in May 1991, a peace accord was signed in Bicesse, Portugal. Both parties agreed to demobilise their forces and hold a National Election the following year. On 12 September 1992 the MPLA won the majority in the new national parliament of the presidency. UNITA's leader, Jonas Savimbi, would not accept the outcome and, on the 1 November 1992, war erupted again, this time with increased intensity and more casualties. UNITA led a brutal campaign against civilians suspected of being MPLA supporters in the areas they controlled. (Vines, 2016)

UNITA gained the offensive momentum by assaults on MPLA-led cities and, by 1994, it was estimated that 60% of the country was under Savimbi's control. In the same year, the Lusaka protocol was signed by both parties, ensuring a short cease fire, but the peace did not last long. In 1998 the two sides were again engaged in war. On 22 February 2002 Jonas Savimbi was captured and killed near the town of Luena. In August 2002 the UNITA forces were demobilised and integrated into the new Angolan Armed Forces (FAA). Another six years would pass before National Elections were held, and various forms of violence remained as an after-effect of the civil war. Landmines were common and political violence surrounding elections were a constant threat (Martin, 2011).

5.4.2.5 Description of affected environment

5.4.2.5.1 Local and regional key Features

None of the documented heritage features for Angola fall within the proposed study area. Angola has one proclaimed World Heritage Site in the north, close to the Congolese border. There are eight other proposed sites, of which six are within Luanda itself, and none are close to the survey corridor. At Lubango there is one local religious site, the statue of "Christ the King", which is the similar to the Jesus figure, "Christ the Redeemer", found in Rio de Janeiro.

Figure 5.114: Christ figure in Lubango

The only other significant heritage sites observed directly, are listed below (refer Figure 5.115):

- The community graveyard close to Lubango;
- A “children’s” graveyard close to Lubango;
- The *Pedra Vermelha Sagrada,* or Sacred Red Stone, just outside of Cahama; and
- A stone cistern built over a water pit in the village of Cavalango.

Interviews with local inhabitants indicated that graveyards are divided along age and gender. Usually children are buried in a separate graveyard (there was no generally accepted definition of what ages are considered “children”). Men and women may be buried in the same cemetery, but in different sections. If someone moved away from their ancestral village, and passed away in another, their bodies are transported back to their ancestral village graveyard for burial (if possible). If this is not possible, then external graveyards can be used, or eventually just a burial site for the foreign individual.

It was not clear how the locations of graveyards are determined, since they seem to have been in use for a long time. It is possible that graves are reused after a certain length of time. It seems likely that these communal graveyards would be located close to a high concentration of people. As such, a map indicating the distribution of occupational structures could provide an indication of where further cemeteries may occur. Both the graveyards observed were within preserved woodland forest patches. According to the villagers, this was to ensure that the deceased have a shaded place to rest and it also serves to demarcate the consecrated area, which should not be disturbed.

Annexure F presents the photographic register of the site visit.

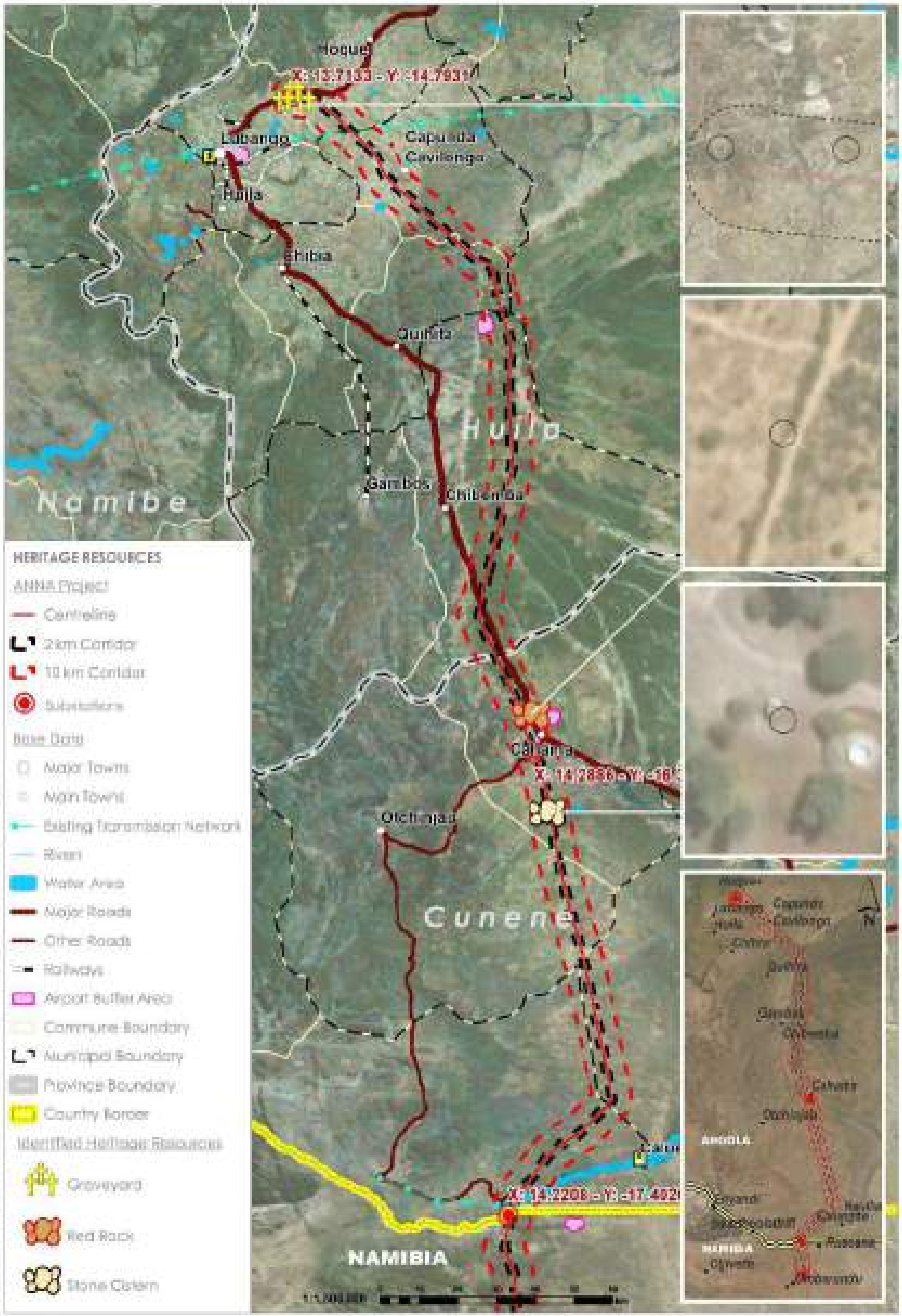


Figure 5.115: Significant heritage sites, directly observed

5.4.2.6 Sensitivity mapping

None of the archival information that was consulted indicated any significant heritage sites or locations within the IAI. Due to this lack of information, the geographic suitability of areas for occupation was used to determine possible areas of prior human activity (the limitations of this approach are discussed earlier in this document). Where possible, these areas were investigated during the field survey, although only a few proved accessible. Areas close to access roads were chosen to allow for observation. Unfortunately, many of these roads could not be accessed on insistence of the demining team due to safety concerns. Most of the areas that the local people occupy have a distinct lack of rocks and stones and, as such, a stone-based vernacular architecture has not evolved within these cultures, as is the case with much of the rest of the Iron Age communities in southern Africa. Houses and stock enclosures are constructed using wood and other materials prone to quick decomposition. Even in areas where rocks are readily available, people continue to use vegetation to construct livestock enclosures and dwellings. Thus, many areas that may have been occupied historically, will have no obvious physical remains indicating this.

5.4.3 Landscape and visual assessment

5.4.3.1 Methodology

The methodology used to assess the landscape and potential visual impact of the project, is based on a South African Visual Assessment Guideline *(Oberholzer, B.2005)* and is set out under this section.

- The landscape was mapped using GIS technology.
- The visual resource (landscape character, landscape quality, sense of place, absorption capacity and visual receptors) was described and assessed.
- Potential tourism attractions and areas with aesthetic potential and cultural value, were investigated.
- The information compiled is depicted in maps, where this was possible due to available information, and identified critical areas are highlighted.

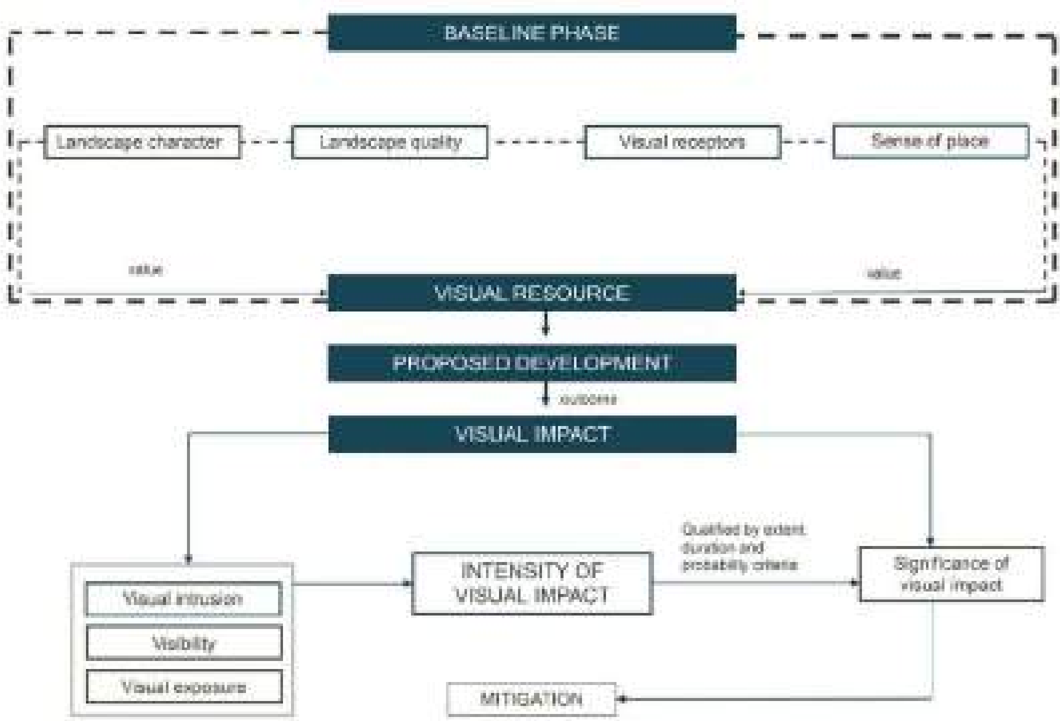


Figure 5.116: Landscape and visual assessment (LVIA) approach

5.4.3.1.1 Spatial scope

The overall study area for this Landscape and Visual Assessment (LVIA) is based on the spatial extent of the infrastructure footprint and a buffer that includes potential indirect effects and cumulative impacts on the environment. For the purposes of the LVIA, the boundary of the study area is set at 10 km on both sides of the proposed alignment (IAI).

5.4.3.1.2 Gaps and Limitations

The following limitations and assumptions are applicable to the LVIA study:

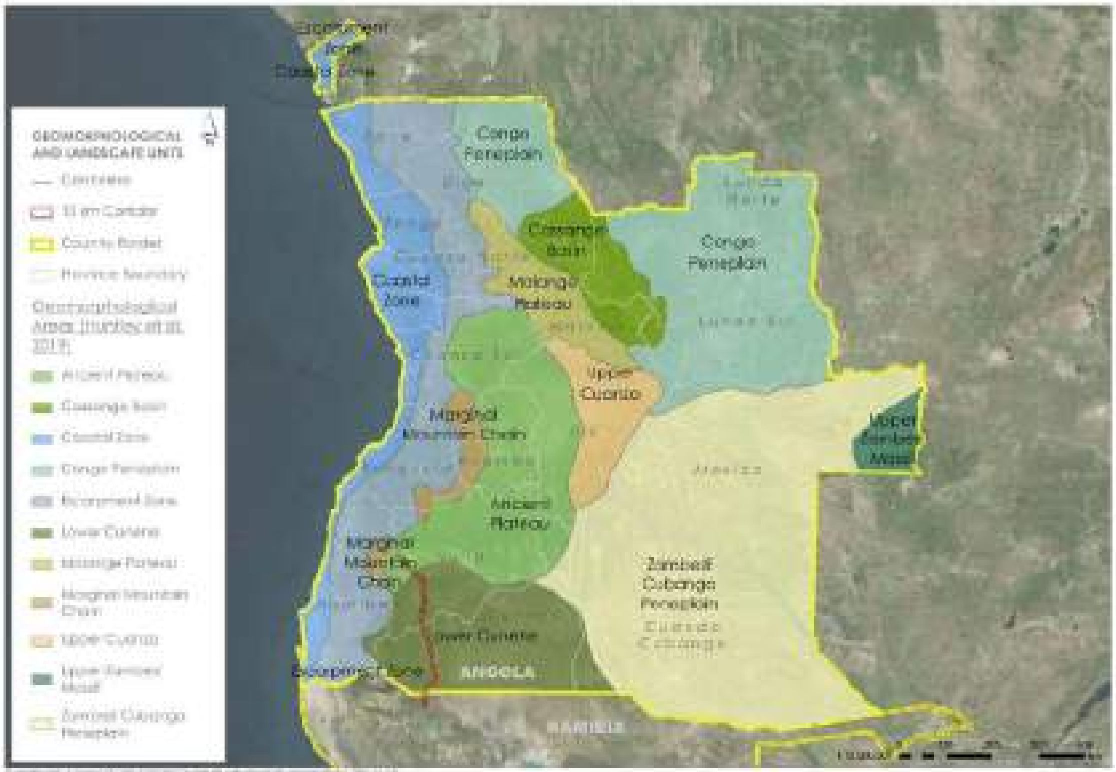
- Determining a visual resource in absolute terms is not achievable. It is a complex procedure since it is determined through a combination of quantitative (visibility) and qualitative (aesthetic value) criteria. Therefore, an LVIA cannot be *entirely* objective in this sense. Individuals will evaluate a landscape differently, based on experience, culture and social background.
- Various factors can enhance or reduce the visual impact of the proposed project, for instance vegetation near a receptor's view of the proposed project. Other factors include weather, climatic conditions and seasonal change. It is therefore difficult to determine the visual impact of the proposed project from the viewpoint of each individual receptor.
- The layouts and technical designs provided are conceptual. Therefore, the possibility of adaptation exists. Should there be any significant changes in the designs of the proposed infrastructure, these changes may have to be reassessed.
- The exact position of construction camps and laydown areas are not available at this stage, hence related detailed viewpoints towards this proposed impact cannot be determined.
- Final design decisions on pylon structures have not yet been made, as the detail engineering stage of the project is not yet underway. The accuracy of visual impact of the powerlines is therefore limited in this regard.
- Visual simulations were not part of the scope of works due to the project still being in a feasibility stage and due to the final locations of the pylons not yet being defined.

5.4.3.2 Current situation

This section of the report analyses the existing landscape character, landscape quality and sense of place of the area potentially affected by the presence of the project. The character and sensitivity of the visual environment within the study area varies at a local scale, depending on the presence of water bodies, ridges, agricultural use, roads, industrial infrastructure and urban and/or rural settlements. The project corridor traverses various landscape units, hence the sensitivity to visual impacts for each of the landscape types therefore differs.

5.4.3.2.1 Regional framework

A major contribution to the ecological understanding of Angola's contemporary landscapes and natural regions, and their agro-forestry potential, is that of Castanheira Diniz. Diniz (Huntley *et al*, 2019) defined 11 "mesological" units for Angola (Figure 5.117). His mesological concept closely corresponds with current perceptions of ecoregions. The ANNA study area runs through Unit 4. Ancient Plateau and Unit 5. Lower Cunene, as described below (Huntley *et al*, 2019).



Source: Huntley *et al*, 2019

Figure 5.117: Primary geomorphological and landscape units of Angola

Unit 4. Ancient Plateau (Planalto Antigo). This extensive plateau drops eastwards from below the Marginal Mountain Chain, and encompasses the headwaters of the Cunene, Cubango, Queve and Cutato Rivers, comprising rolling landscapes with wetlands, low ridges and scattered granitic inselbergs. It drops from 1 800 mamsl in the west, to 1 400 mamsl in central Angola.

Unit 5. Lower Cunene (Baixo Cunene). This is a rather artificial unit, leading imperceptibly down from 1 400 mamsl on the 'Ancient Plateau', to the frontier with Namibia at 1000 mamsl. The gentle gradient of the eastern half forms the very clearly-defined Cuvelai Basin, which drains as an ephemeral catchment into the Etosha Pan. West of the Cunene, the landscape is more broken, with pockets of Kalahari sands between low rocky hills.

5.4.3.2.2 Landscape units

5.4.3.2.2.1 Topography

The study area runs through areas of relatively low topographic variation, except for the area where it crosses the Kunene River (Figure 5.32). The topography of the northern and central parts of the proposed alignment have minimal topographical diversity and are largely associated with flat outstretched plains. The dominant landscape features for the last 20 to 25 km of the corridor, north of the Namibian border, can be described as networks of trailing rivers and smaller streams within valley slopes.

From the Lubango substation to the Namibia-Angola border, the relief decreases from 1 710 mamsl to 800 mamsl. This represents a 910 m decline over 331 km which, on average, is equivalent to a drop of 3 m over 1 km, i.e. a very flat territory.

5.4.3.2.2.2 Main vegetation units

As stated in Section 5.3.2, the study area is included in various woodland ecoregions. The landscape is covered with open stands of trees, the crowns of which form a canopy at a height of 3 to 20 m, or more, and which cover at least 40% of the surface. The trees are frequently more widely-spaced and may reach a distance of up to a tree's crown apart.

Angolan miombo woodlands

The northern part of the IAI runs through the Angolan miombo woodlands ecoregion. The dominant tree species include *Brachystegia Julbernardia* and *Isoberlinia.* The understorey is dominated by smaller shrubs and groundcovers, whilst grass species dominate in sandy soils. Miombo is on average 10-20 m tall, but scrub miombo can be as short as 3 m. The grass understorey is generally 0.6-1.2m high, with scattered culms of species reaching 2 m high. There is usually little foliage between the field layer and the lower canopy, and visibility is unimpeded for 50 m or more. Canopy height is usually less than 15 m.

Zambezian Baikiaea woodlands

A small portion of the IAI falls within the Zambezian Baikiaea woodlands ecoregion, in which Zambian teak (*Baikiaea plurijuga*) is the dominant tree species. Small shrubs are scattered beneath the thicket during the rainy season and grasses vary from sparse to dense.

Angolan mopane woodlands

The largest portion of the proposed corridor traverses the Angolan mopane woodlands ecoregion. Mopane trees (*Colophospermum mopane*) dominate the vegetation, the tallest being between 7 and 10 m in height. In Angola, this species occurs as a shrub, intermingled with scattered trees and other shrub individuals, covering vast areas in a low thorny bushveld. Grass is sparse or absent in the understorey.

As a direct result of fire, mopane woodland may be converted to shrubby mopane grassland in which multiple-stemmed coppices, varying from 0.3 m to 1.6 m high, is produced from the base of the charred original trunks. There is usually an equally-tall cover of grass between the individual coppiced clumps.

5.4.3.2.2.3 Land cover and land use

As mentioned in Section 5.2.4.3, land cover describes the physical make-up of an area, based on interpretation of satellite imagery. The study area's land cover can be divided into the following main units, relevant to this landscape assessment:

Natural areas - consisting of large expanses of sparsely-inhabited areas, this unit covers most of the study area and is characterised by the presence of very dry areas shaped by the absence of rivers and very few water resources. This natural unit includes wetlands, woodlands, indigenous forests, shrubland and grassland.

Rural settlements (associated with subsistence farming) - concentrated settlements are distributed along the banks of the main water streams and rivers. These areas have fertile soils and therefore subsistence farming is widely practiced. The main crops include maize, massango, tubers and massambala.

Semi-nomadic communities settle permanently, or temporarily, near dry or temporary watercourses. These settlements are characterised by organised circular-shaped small villages enclosed by a fence of thorny branches and other shrub trees.

Figure 5.118: Typical subsistence farming

Urban areas - There are no large urban towns within the study area. Towns such as Capunda Cavilongo and Cahama village, located adjacent to the study area, have a low population density. The town is largely characterised by dirt roads and dispersed, formally-built small to medium-sized buildings.

Figure 5.119: Cahama village

Mining - This land unit is not well represented within the study area, although there are a few ornamental rock mining exploitations in the region.

Irrigation-fed agricultural crops - As one moves further north, larger, irrigation-fed tracts of cropland become more evident in the area around Chibia.

5.4.3.2.2.4 Aesthetic and culturally significant landscapes

The only identified aesthetic landscapes, from an already-implemented tourism perspective, are the Bicuar National Park and the area around the Ruacana Falls, which was a finalist in the 2014 initiative “Seven Natural Wonders of Angola” (category Waterfalls), especially viewed when crossing the vehicular bridge over the Cunene River.

The proposed corridor does not traverse the Bicuar National Park, but the closest that the DAI reaches to the park is at its western border, at a distance of approximately 500 m. The corridor also bypasses the Ruacana falls, although it is located close to it (~1 km).

5.4.3.2.2.5 Landscape unite and subunits

As previously mentioned in Section 5.4.3.2.1, the study area is included in the Ancient Plateau (Planalto Antigo) and Lower Cunene (Baixo Cunene) primary Angolan landscape units. Within these main units, landscape subunits can be identified by assessing the landscape in terms of significant relief/topography, vegetation units, land use/cover and aesthetic/cultural features. The identified landscape subunits are as follows:

- Natural areas - This unit has an important value in terms of wellbeing, contributing to the sense of place and aesthetic appeal of the local area;
- Rural settlements - associated with subsistence farming;
- Urban areas;
- Mining areas;
- Irrigation-fed agricultural crops; and
- the Bicuar National Park.

5.4.3.2.3 Landscape character

Landscape character includes the natural and man-made attributes of the study area, including topography, land cover and vegetation, as described above. The overall landscape character is influenced negatively by incompatible activities, or positively by the presence of natural or man-made features that enrich the character, such as steep gradients, the presence of rocky ridges, natural vegetation, pans and floodplains.

The overall landscape character of the area is defined by the vast, open flat terrain, the predominant agricultural and natural landscape features, as well as an overall rural feel. The large expanses of sparsely-inhabited territory, with a low to moderate presence of vegetation and minimal topographic diversity, offer little value in terms of screening of the proposed project activities and hence of the potential visual impact of the project.

5.4.3.2.4 Landscape quality

Landscape quality is defined by human perceptions and expectations in the context of the existing environment. The landscape quality is based on a combination of the landscape's intrinsic physical properties, consisting of the land form, vegetation, water, colour, adjacent scenery, scarcity, cultural or man-made modifications, and the landscape's Visual Absorption Capacity (VAC).

VAC is an indication of the ability of the landscape to visually conceal a project/development. Areas with a high VAC can accommodate and absorb physical changes in the landscape without transforming its visual character and quality. The factors that contribute to the VAC factor include slope, vegetation height and visual pattern.

VAC, in terms of topography, can be expressed as follows:

- High VAC – Slope >7%
- Moderate VAC – Slope between 3 -7%
- Low VAC – 0 -3%

VAC, in terms of visual pattern/diversity, can be expressed as follows:

- High VAC – A diverse visual pattern, such as built-up areas and industrialised/mining zones, where tall structures provide a high degree of screening.

- Moderate VAC – A moderately diverse visual pattern, such as rural and medium to low-density urban and rural areas
- Low VAC – A uniformly visual pattern, such as naturally-landscaped areas with little or no manmade structures

VAC, in terms of vegetation height, can be expressed as follows:

- High VAC – Vegetation height greater than 5 m
- Moderate VAC – Vegetation height between 1 and 5 m
- Low VAC – Vegetation height less than 1 m

Table 5.26: VAC rating

VAC rating	Rating
High	1
Moderate	2
Low	3

The assessment of the VAC within the study area is discussed below.

Table 5.27:Visual absorption capacity

Topography	Pattern/Diversity	Vegetation height	Combined VAC
Low VAC 3 Average of a 3 m rise in elevation over 1 km	Low VAC 3 Natural landscape with few manmade structures	Moderate VAC 2 Some individual trees can reach a height of 10 m or more but, in general, the understorey vegetation height is less than 5 m	**2.7** **Low VAC**

The landscape quality increases with the presence of water, topographic ruggedness and where diverse patterns of vegetation occur. Areas that contain more natural features, or harmonious manmade compositions, will have a more favourable landscape quality than areas with a non-harmonious human activity. Landscape quality is rated from low to high, as indicated in Table 5.28.

Table 5.28: Landscape quality rating

Landscape quality rating	Criteria	Rating
High	Unmodified landscape: The landscape is almost free from human encroachment, hence there is visual integrity and, where human intervention is visible, no visual discontinuity occurs, and visual order is harmoniously maintained. Strongly-defined land forms are noted, including mountains and large bodies of water. Distinct visual patterns are formed through patterns, colours and textures.	3
Moderate	Moderately-transformed/disturbed landscape: There is an average visual integrity between the natural and manmade landscape. Some visual encroachment is visible which lacks visual order. There is some disruption of the natural and manmade patterns. Moderately-distinct landscape patterns are visible, including rolling hills and smaller water bodies.	2
Low	Extensively transformed human intervention: There is low or no visual integrity between the natural and manmade features. The visual integrity of the landscape is disrupted and visual order is entirely lost. Few visual patterns are formed, and vegetation patterns, colours and textures are not noticeable.	1

The landscape quality assigned to the primary identified landscape subunits, is presented in Table 5.29 and the combined VAC is showed in Table 5.27.

Table 5.29: Landscape quality

High (3)	Moderate (2)	Low (1)
The natural landscape around the Namibian–Angolan border, where the alignment crosses the Kunene River. The Bicuar National Park. Natural landscape consisting of large expanses of sparsely-inhabited areas.	Small rural settlements associated with subsistence farming. Irrigation-fed agricultural crops.	Urban areas and larger towns such as Cahama village. Mining areas.

The overall landscape quality is considered high because of the dominant horizontal scale of the study area, the minimal presence of manmade structures, and little visual discontinuity and interruption of the natural environment.

The overall landscape is uncluttered, creating a homogenous visual quality, with minimal vertical elements and visual discontinuity of the natural environment. The woodland-type vegetation, moderately-spaced trees, cultivated fields and the predominantly low-growing understorey vegetation, provides little potential to conceal infrastructure such as that proposed by this project. The natural vegetation, with little manmade infrastructure, is visually uniform, offering a low visual pattern within the landscape.

5.4.3.2.5 Viewer/receptor sensitivity

Receptors of visual impacts are potential viewers of the proposed development. Receptor sensitivity refers to the degree that a development affects people. Receptor sensitivity depends on the number of people viewing the project, and their perceptions of the study area. Perception of an object is linked to the purpose for which a viewer is present in the study area (i.e. the reason for their visit). The sensitivity of an individual to the visual impact of a proposed development may, therefore, also vary over time as they experience different features and land uses in the area. Receptor sensitivity is also affected by how likely the receptors are to be affected. It is also dependent on their perception of the area and their ability to adapt to changes in their environment and can include how frequently they are exposed to the view.

A visual receptor's sensitivity is based upon the viewer's:

- Familiarity with the actual scene;
- Circumstances that brings them into contact with that view; and
- Nature of the view (full, or glimpsed, near or distant).

Receptor sensitivity is expressed as follows:

- High sensitivity – e.g. views to and from nature reserves, coastal areas and scenic routes or trails;
- Moderate sensitivity – e.g. views to and from residential areas, agricultural areas, sporting/ recreational areas, or places of work; and
- Low sensitivity – e.g. views to and from industrial, mining or degraded areas.

The criteria used to define receptor perception are summarised in Table 5.30.

Table 5.30: Receptor perception rating

Receptor perception rating	Criteria
High (3)	People attach a high value to aesthetics, such as in or around a game reserve, coastal areas, scenic routes or conservation areas, and the project is perceived to significantly impact on this value of the landscape.
Moderate (2)	People attach a moderate value to aesthetics, such as neighbourhoods and smaller towns, where natural character is still plentiful and in close range of residency.
Low (1)	People attach a low value to aesthetics when compared to project benefits such as employment opportunities. The environment has already been transformed.

The selected viewpoints are based on viewing position and are used as a base for determining the significance of the potential visual impacts.

Table 5.31: Project-specific receptor sensitivity

Receptor perception rating	Project-specific receptor
High (3)	People crossing the Ruacana border between Namibia and Angola; People visiting the Ruacana falls; and People visiting the Bicuar National Park.
Moderate (2)	People travelling on the main, inland north-south road.
Low (1)	Permanent residents in Cahama (likely to consider transmission lines as a sign of progress); Informal dispersed settlements and associated subsistence farming (also likely to consider transmission lines as a sign of progress)/

5.4.3.2.6 Sense of Place

The sense of place in the study area derives from the combination of the landscape units and subunits and their impact on the senses and is influenced negatively or positively by natural or man-made features or activities that interrupt the vast open space. Sense of place is informed by aspects such as the scale, texture, land form, enclosure and land use within the territory.

The landscape forms a plateau in the vicinity of Chimucua, where the natural woodland almost completely disappears, and the landscape is represented by a patchwork of croplands, with small intercepted mosaics of natural vegetation associated with small human settlements.

In the vicinity around Cahama, moving north, the landscape becomes less arid, natural woodland becomes more dense and larger irrigation-fed crops become more evident. Human infrastructure is mostly grouped around the town of Cahama, where some of the buildings are still in a damaged state from the not-too-distant civil war.

Along rivers, naturally-occurring woodlands have been cleared to make way for small patches of subsistence farming. These cultivated areas are informally grouped and organically shaped. The landscape is further defined by a flat, to slightly undulating, terrain, with low-growing vegetation and networks of sandy footpaths linking smaller rural settlements with rivers and larger dirt roads.

The southern section of the study area is represented by a semi-arid landscape, visually uniform with little manmade infrastructure, except for some smaller infrastructure elements around the Ruacana border post. The Kunene River forms a strong contrast with the surrounding parched landscape.

5.4.4 Hazardous and non-hazardous waste management

Waste management in Angola is regulated by the Waste Management Regulation (Presidential Decree no. 190/12 of 24 August), which aims to establish the general rules on the: generation, disposal in soil and underground, release into water or atmosphere, treatment, collection, storage and transport, of any hazardous and non-hazardous waste. In addition, Executive Decree no. 17/13, of 22 January, covering Construction and Demolition Waste Management, establishes the legal regime for the management of waste resulting from construction works or demolition, including the prevention, reuse, collection, transportation, storage, sorting, treatment, recovery and disposal, of this sort of waste.

With the creation of the National Waste Agency (ANR1) in 2014, the waste sector began to take on a new form. ANR has, as its main functions, the regulation of the public concession of services in the solid waste sector, the implementation of public policies for waste management and the creation of waste management programs regarding production, reuse, recycling, treatment and final disposal.

In Angola, the main waste generation focus is in the urban centres, primarily in the vicinity of the large wholesale and retail distribution warehouses and informal markets. The waste generated here is often dumped in heaps, without containment, and it should be noted that the population, in general, disposes of garbage on the street, or dumps it in drainage ditches, watercourses, railway lines, etc.

The nearly 30 years of civil war in Angola left the country with infrastructure that, in a short time, became insufficient due to the rapid and uncontrolled growth of the areas to where people relocated, especially in the receiving cities. Additionally, waste collection services face the following difficulties (Almeida, 2017):

- Rapid, and uncontrolled, population growth in large urban centres and the consequent disorganisation of the urban structure;
- Lack of regulation, oversight, resources and waste cleaning and collection companies in some provinces;
- Very heavy traffic in urban areas, especially during rush hour, due to the lack of roads with capacity to carry the current traffic load, which compromises the logistics of waste collection;
- In the rainy season, streets used as alternative routes become impassable as they become flooded due to the lack of adequate drainage in urban areas. Waste collection vehicles are unable to collect in certain areas due to existing roads becoming impassable;
- Collection vehicles frequently have mechanical faults and spare parts for required maintenance are sometimes unavailable and need to be imported;
- In all areas where street fairs and informal markets take place, which is many urban neighbourhoods and spread throughout municipal and/or communal headquarters, the organisation of these markets is lacking and they are set up in the middle of streets and/or pavements/sidewalks, disrupting traffic and, ultimately, leave a large volume of scattered waste behind;
- Poor civic awareness, environmental education, lack of basic hygiene knowledge and ignorance on the part of the population, who still have the habit of not packing waste into bags but rather transport it in buckets and throw it in a certain place, forming informal garbage dumps, which are scattered everywhere and makes it difficult for waste services to collect.

In the study area, the abovementioned applies to the city of Lubango, which has garbage accumulation in various locations and evident difficulties in the management, collection and final disposal of the waste produced. Further to this, and according to Almeida (2017), the waste from medical facilities, such as syringes, needles, surgical equipment, medicines, reagents, among others, are placed directly into containers and, in the absence of containers, these are disposed of in unsuitable areas and without any kind of prior safety/sterilisation treatment.

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1 Agência Nacional de Resíduos

Waste collection and treatment is the responsibility of the Lubango Municipal Administration (AML), in partnership with companies appointed for this purpose. This waste collection system covers only the areas associated with the paved road network in the city centre. In this Municipality, the urban solid waste is deposited at two formal dump sites:

- The Micha dump; and
- The Luyovo dump, in Quilemba.

At neither of the above waste dumps is the waste separated/sorted or incinerated.

With regards to the province of Cunene, and according to information gathered on the internet1, the Ondjiva landfill was inaugurated in 2017, and constructed on an area of 4.8 ha in extent. This landfill site has a capacity to store 90 000 m^3 of waste, predominantly serving the closest municipalities.

In rural municipalities in the study area, urban solid waste collection and treatment is carried out more informally. However, it should be noted that at the municipal and communal headquarters there is a clearly evident effort by the general population to maintain public spaces in a clean and orderly manner.

1 http://jornaldeangola.sapo.ao/provincias/cunene/mais_um_aterro_sanitario_para_residuos_solidos; accessed November 2019.

6 Potential environmental and social impacts and mitigation

6.1 Introduction

This section presents the potential social and environmental impacts of the project activities on the receiving environment, also referred to as “the baseline” and which was described in Section 5. Only construction and operational phases have been assessed, as decommissioning is not intended. Each potential impact has been assessed according to the methodology described in Section 4.4.3, and mitigation measures have been provided. An assessment of cumulative impacts and of the No-Go alternative has also been included.

- The identification and assessment of potential cumulative impacts which could result from the implementation of the ANNA project, was based on the following criteria. A cumulative impact is considered as an environmental or social impact that results from the sum of effects arising from past, present or planned human actions in a given area, regardless of whether the entity responsible for the action is public or private. To identify and assess potential cumulative impacts, the following methodology was followed:
- Direct and indirect impacts, associated with project implementation, were determined, and appropriate mitigation measures are proposed;
- Existing and planned projects, infrastructure and actions were identified for the project's areas of influence, which was based on the collection of information from various sources (internet, local administrations, population, etc.).
- Identification of potentially affected biophysical, socio-economic and cultural resources;
- Depending on their combined action, identification of potential effects on each of the environmental and social aspects considered in this ESIA.

As mentioned previously, the study area is predominantly rural, with a mosaic of savannah, scrubland and forest, with agricultural fields, usually associated with small settlements as described in Sections 5.2.4.3 and 5.4.1.3.2. Within the IAI, the two urban areas present are rural in character, with a central organised area, and peri-urban area with an informal structure.

As for as expanding the electricity grid is concerned, as explained in Section 2.11, this is dependent on the ANNA project proceeding and being implemented, as it is only possible to supply electricity to the planned substations after this project has commenced. This is especially true for power distribution through the Cahama substation, since this substation can only exist if the ANNA Project is implemented.

In addition, it should be noted that in the provinces in which the project operates, there are a number of existing or planned activities that may contribute to cumulative impacts in conjunction with the ANNA project. In this case, the following infrastructure, activities and projects are significant:

- The Lubango urban area;
- Main communication routes:
  - Lubango-Cahama-Ondjiva road
  - Mozamedes railway line, including the Chibia extension;
- Industrial and ornamental rock mines/quarries, between Lubango and Cahama;
- Large cattle farms (Huíla) and large agricultural farms, irrigated from the Cunene River (Cunene); and
- The Baines Dam, on the Cunene River.

6.2 Physical Environment

6.2.1 Climate and climate change

6.2.1.1 Overview

The approach, to assess the potential impacts associated with climate change within the IAI, considered two types of anticipated situations:

- the impact of the project activities on climate change (based on the assessment of the GHG emissions of the project – refer to Section 6.2.1.2 for the methodology); and
- the impact of climate change (as assessed in Sections 5.2.1.4 and 5.2.1.5) on the project infrastructure.

6.2.1.2 Methodology for the assessment of the GHG emissions of the project

6.2.1.2.1 Approach

The approach to the assessment of GHG emissions aims to link project objectives with their potential impact on GHG emissions. Three categories of emission impacts are defined, with the physical boundary consisting of the physical sites where the project will be constructed, which includes substations, transmission lines, and the right-of-way corridor for a transmission expansion project.

Activities beyond the physical project boundary may include additional investment in power generation, and changes in non-grid energy sources, and indirect impacts will only occur if these activities are implemented. The resultant indirect impacts cannot be fully attributed to the project, despite the project contributing to the subsequent reduction or increase in emissions resulting from these actions. Direct emissions are emissions attributable to the project. All impacts were considered for the same project life that was used to conduct the technical and economic analyses during the project appraisal.

6.2.1.2.2 Methodology applied

Traditionally, impact assessments are conducted by determining how a proposed project's activities are expected to affect the environmental conditions that existed prior to the implementation of such a development. Assessing the impact of GHG emissions is complicated due to GHG emission impacts not being quantifiable within a defined space and time. GHG emission impacts occurs on a global scale, with the geographical source of emissions being irrelevant when evaluating the impact on future climate. It is therefore impossible to link emissions form a single source, such as the ANNA 400 kV transmission line, to specific impacts within the study area.

While the social cost of carbon (SCC) has been considered as part of social impact assessments of GHGs, there are no standardised guidelines for determining the SCC for a single project. This is due to the complexity and uncertainty related to climate change and its drivers, as well as climate change assessments requiring value judgements to be made about the comparative importance of impacts over time. Angola and Namibia do not have accepted frameworks for estimating GHG assessments.

Accordingly, this project's assessment does not consider the physical impacts of climate change that may result from increased GHG emissions. This Report frames the impact of GHG emissions by:

- Presenting the scale of the project's GHG emissions by comparing total emissions to that of similar projects;
- Assessing GHG emissions by referencing relevant benchmarks of the GHG intensity of transmission line projects; and
- Considering the impact of the project on Angola and Namibia's national GHG inventory, and extent of alignment with national climate change policies and international mitigation commitments.

The project's impact, in terms of GHG emissions, reflects GHG emissions resulting from the construction of the transmission lines. Potential operational emissions are identified based solely on a literature review and on operational emissions associated with similar projects.

In the context of climate change impacts resulting from GHG emissions, magnitude is the primary criterion used to assess impact significance. The other criteria are all the same, irrespective of project context and scale of GHG emissions, and do not present a good basis on which to assess the significance of impacts. GHG impacts occur on a global scale, with the duration being largely permanent and, due to the large body of scientific research linking GHG emissions to climate change, the probability of impact is assumed to be definite. Magnitude is gauged through the application of reference benchmarks. Alignment with national climate change policies is also taken into consideration.

The measurement of GHG emissions produced directly or indirectly by the project, is expressed in terms of the project's carbon footprint. The overarching equation for calculating carbon footprints entails:

Carbon footprint/GHG emissions = Activity Data x Emission Factor x Global Warming Potential (GWP)

- Activity data: Record of emission-causing activities;
- Emission factor: Applied to convert activity data into GHG emissions; and
- Global Warming Potential (GWP): Applied to non-CO_2 GHGs to convert these to the carbon dioxide equivalent (tCO_2e) for measurement purposes.

The carbon footprint for the project has, as far as possible, been estimated in accordance with the GHG Protocol: Corporate Accounting Standard (WBCSD/WRI, 2004) and GHG Protocol for Project Accounting (GHG Protocol 2005a). These documents provide guidance on the accounting and reporting of GHG emissions for a range of sectors and emission sources. The same approach is applied for national GHG inventories based on the IPCC guidelines for national GHG inventories (IPCC, 2006a).

Activity data was sourced from the project feasibility study, following a focussed request for data. Emission factors have been sourced from the 2006 IPCC Guidelines, and updated guidelines, and GWP taken from the IPCC's Fourth Assessment Report (IPCC, IPCC Guidelines for National Greenhouse Gas Inventories, 2006), updated in conjunction with the "2019 Refinement to the 2006 Guidelines for National Greenhouse Gas Inventories".

In order to obtain the activity data, the following actions were undertaken:

- A focused request for data was submitted and populated, based on the feasibility study (Aurecon, 2019), with support from the project's quantity surveyor/engineering team; and
- Additional requests to obtain information on the GHG information for the construction phase.

It must be noted that there is no sufficient information available on the operation and decommission phases of the project lifecycle, as the project is currently in the feasibility phase. As a result, the GHG emissions resulting from these phases could not be assessed in detail.

Drawing on available activity data, the relevant GHG emission factors and GWPs were applied to estimate the total emissions emitted and the "carbon dioxide equivalents" (tCO_2e).

6.2.1.2.3 Project emissions boundaries

The project will require input materials for construction activities, and will consist of a construction, operational and, ultimately, decommissioning phase. These phases will occur at different times in the project lifecycle, potentially covering multiple decades. The ideal situation would be to include all the lifecycle phases in the calculation of the impacts from non-generation GHG emissions (i.e. GHG emissions from sources other than power generation sources) (refer to Table 6.2 below for impact categories) but, as discussed above, only the construction phase has been assessed in detail.

The estimation of GHG emissions will always be dependent on the availability of data. The proposed project boundary for the non-(power)generation emissions was taken into consideration for the purposes of this study, and was dependent on data availability. The boundary limits for the non-(power)generation emissions sources, was considered to include activities associated with:

- Materials used in construction;
- Construction of powerlines and substations;
- Electricity transmission; and
- Disposal of lines and substations.

The assessment of the project's impact, as a result of GHG emissions, needs to focus on the degree to which system emissions are likely to change, i.e. comparing the baseline scenario with the project scenario. For non-(power)generation related impacts, the net result is always an increase in GHG emissions, but transmission projects have the potential to significantly impact emissions across the greater electricity system. The regional scenario is discussed in section 6.2.1.3.1.2.

6.2.1.2.4 Scope

The estimation of project GHG emissions, as per the IFC (2012), should include:

- Scope 1 Emissions: Direct emissions from sources under the ownership or control of the project.
- Scope 2 Emissions: Indirect emissions form the consumption of purchased electricity.

The following emission sources were considered for inclusion in this project's assessment:

Table 6.1: Emission sources considered for the ANNA project

Phase	Source	Data availability
Construction	Scope 1: Stationary combustion from generators	Available
	Scope 1: Mobile combustion emissions from vehicles and equipment	Available
	Scope 1: Mobile combustion emissions from transporting materials and personnel to site	Available
	Scope 1: Land use change emissions	Available
	Scope 1: Fugitive emissions	Not available*
	Scope 2: Emissions from the consumption of electricity for construction and staff accommodation on site	Limited availability*
Operation	Scope 1: Mobile combustion emissions from vehicles and equipment	Not available*
	Scope 1: Mobile combustion emissions from transporting materials and personnel to site	Not available*
	Scope 1: Fugitive Emissions	Discussion presented, with reference to continental emissions factor for SF_6 fugitive emissions. Detailed data and estimates not available.*
	Scope 2: Emissions from the consumption of electricity for maintenance	Not available*
Decommission	Not available	Not available*

*Emissions arising from activities for which sufficient data was not available, were excluded from the calculations.

Depending on the availability of information, the sources for which emissions could not be calculated in detail, are discussed briefly in terms of their nature, global averages, emission factors and emission rates from similar projects, where possible.

6.2.1.3 Potential impacts and mitigation

6.2.1.3.1 Impact of the project on climate change

6.2.1.3.1.1 Categorisation of emission impacts

The primary distinction made between different GHG impacts related to electricity transmission projects, are non-generation and generation impacts, with generation impacts consisting of direct and indirect generation effects (Madrigal & Fecher, 2010). These three categories are defined in Table 6.2, and the definitions assume the physical boundary of the transmission project as consisting of the physical site where the project will be constructed. The definitions serve to distinguish how the project may affect power generation. An international interconnection project, such as the ANNA transmission line, has the potential to have short and long-term impacts, by allowing cleaner and more affordable power generation to displace less environmentally-friendly power generation and, in the long-term, and by increasing generation capacity and efficiency for the integrated market. It must be noted that the short and long-term benefits, and new investments, can only be realised under conducive financial and regulatory conditions, which is beyond the control of the ANNA transmission line investors and operators. Therefore, indirect impacts are not fully attributable to the project, although the ANNA project may contribute to the increase and reduction of emissions across the entire energy system.

Table 6.2: Categories of project impacts on GHG emissions (Madrigal & Fecher, 2010)

Impact category	Definition
Non-generation impacts	Similar to standard corporate or national inventory. Effect emissions that occur within the physical boundary of the project, and possibly through the lifecycle of a project.
Direct generation impacts	Effect on short-term and/or long-term generation emissions that does not require any other actions outside the physical boundary of the project. This would be the case for technical loss reduction projects.
Indirect generation impacts	Effect on short-term and/or long-term generation emissions that requires actions outside the physical boundary of the project. This would be the case for increased reliability, capacity expansion, electrification and cross-border trade.

Emissions at the physical project site do not have a baseline, since there would be no emissions without the project, thus the net change in emissions will always be positive for non-generation impacts. Assessing power generation impacts requires, and allows for, the development of a baseline scenario to estimate the change in emissions from power generation activities, across the electricity system, as a result of the project. These generation-related impacts are presented below, framed by the impact of the project on the regional emission scenario.

6.2.1.3.1.2 Potential Impact of ANNA on regional CO_2 emissions per scenario

At a regional level, the implementation of the ANNA project, as an individual project, will not significantly impact on overall regional CO_2 emissions under either the reference, or any other, scenarios investigated. This is mainly due to the projected demand growth in the region that is still high compared to the low-emissions hydro-energy sources. The simulated emissions per scenario is shown in Table 6.3. Two scenarios, “delayed transmission” as well as the “self-sufficiency scenario”, show an increase in annual emissions, while the remaining scenarios show a decrease in CO_2 emissions of between 886 and 34 778 kilotonnes over the study period.

Table 6.3: 2025 to 2040 CO_2 emissions (kT)

Scenarios	Description of scenario	CO_2 Emission (kT)
Reference	Applies the respective utilities’ generation aspirations, as articulated within the SAPP 2017 Masterplan Component A, with the exception of Angola and Namibia.	(8.492)

Scenarios	Description of scenario	CO_2 Emission (kT)
Hydrological Shock	This scenario assumes a dry season and its impact on the hydro-power plants. The hydro-power plants' capacity factor is reduced. The northern countries will be impacted more, as they are heavily reliant on hydro-power, as opposed to the southern countries that are more reliant on coal. The capacity of the coal power plants is increased to compensate for the reduction of power output of the hydro-power plants. This scenario assesses whether the ANNA line offers any benefit to alleviate the hydrological shock impact.	(886)
Eskom Hydro Import	South Africa's Integrated Resource Plan (IRP) makes provision for importing additional hydro-power. This scenario assesses whether the ANNA interconnector can facilitate the import of hydro-power if the more expensive HVDC link from DRC to South Africa is delayed.	(34.778)
Delayed Tx Lines	This scenario assesses the benefit for ANNA, if the other planned interconnectors are delayed by 3 years from the anticipated commissioning dates.	23.181
Self Sufficient	This scenario is the same as the reference scenario except that a reserve margin of 10% firm was imposed in all countries, where only domestic firm generation capacity (i.e. excluding PV, wind and cross-border interconnectors) can contribute to the reserve.	17.990
Suppressed Demand	This scenario is the same as the reference scenario except that, in all countries, demand (energy and peak) is reduced by 10% in all years. The objective of this scenario is to assess if there will be any flows on ANNA (financial and economic benefit) if the region experiences a suppressed economic growth.	(18.916)

The simulated increase (reduction) of CO_2 emissions per scenario over the study period is shown in Figure 6.1.

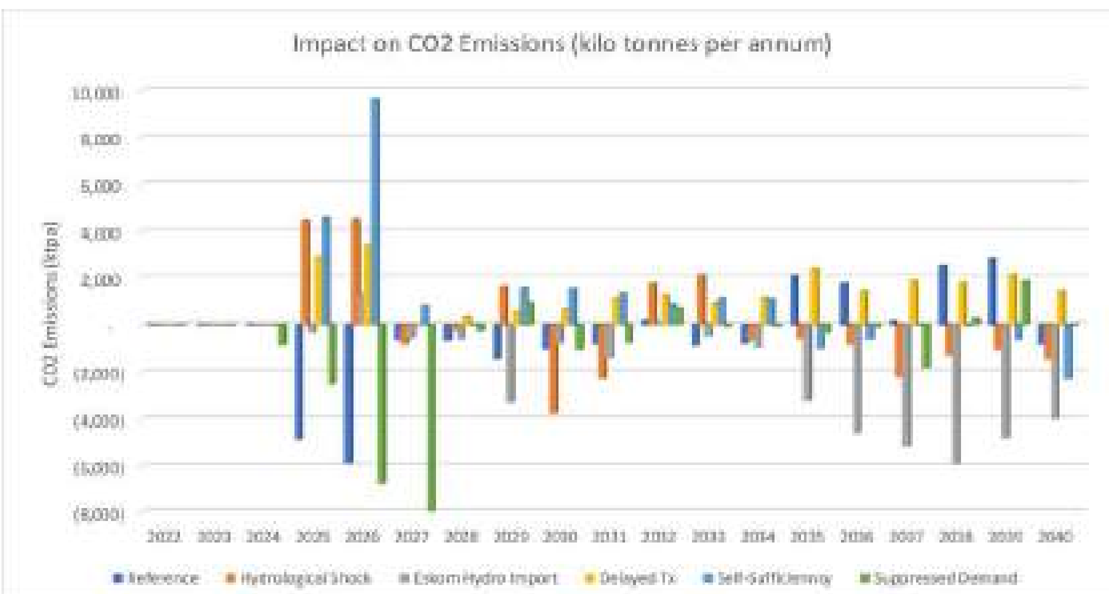

Figure 6.1: CO2 emissions per scenario (kT)

6.2.1.3.1.3 Construction emissions

The embodied emissions of construction material are likely to be a significant contributor to GHG emissions for transmission projects involving extensive infrastructure, relative to the amount of power being delivered, as is generally the case with long-distance transmission lines. For long-distance lines, the embodied emissions of the material of the lines, will outweigh that in substations and other equipment.

Detailed data was provided for construction activities and materials to be used. It is estimated that the construction period will take place over a total of 104 weeks, although the exact commencement date and timing is yet to be determined.

Land clearing for the construction of the Angolan section of the line is expected to entail the clearance of an area of 1982.33 ha[1]. Based on the limited information available, the vegetation types, classified according to the IFC CEET table and IPCC Guidelines (IPCC, 2006) are:

- Natural Forest – Tropical Shrubland – 844 ha
  - Above ground biomass - 32.9 t C/ha
  - Below ground biomass - 13.2 t C/ha
- Grassland – Warm Temperate (Wet) – 730.36
  - Above ground biomass – 1.08 t C/ha
  - Below ground biomass – 1.6 t C/ha
- Cropland – Annual crops (all) – 406.98
  - Above ground biomass – 4.7 t C/ha
  - Below ground biomass – non applicable.

The total above and below biomass is presented in terms of the total above and below ground carbon density of the specific vegetation type, excluding soil carbon, litter and dead biomass. Thus, total estimated emissions from land clearing in Angola is 579 865.23 tonnes CO_2e.

The total construction phase emissions for the entire ANNA transmission line, calculated based on available activity data, is presented in Table 6.4.

Table 6.4 Summary of the significant contributors to the overall carbon footprint for the construction phase in Angola

Significant materials (figures include transport to site)	tonnes CO_2e	Contribution to total
Angola		
Plant and equipment - Diesel	223 235.73	38%
Steel: General - UK (EU) Average Recycled Content	192 049.45	33%
Aluminium: General	68 614.02	12%
Site accommodation - Diesel	30 985.40	5%
Concrete: XC2	18 686.80	3%
Steel: Bar & rod - UK (EU) Average Recycled Content	3 191.01	1%
Personnel travel (estimated)	195.39	0%
Sheet piling: medium-use	42.61	0%
Clay: general (simple baked products)	41.07	0%
Land clearing	42 823.75	7%
Total for Angola	**579 865.23**	**100%**

6.2.1.3.1.4 Additional emission sources and impacts

Detailed activity data to calculate GHG emissions during the operational phase and decommissioning phase of the project lifecycle was not available. Emissions during operations could therefore not be

1 Worst-case scenario: 30 m of land clearing from each side of the centre line, i.e. a 30 m wide corridor (refer to Section 6.2.4.2.3 for more details on the calculation approach)

estimated. Below is a brief discussion of potential emission sources, and impacts and benefits which may be realised as a direct result of the project during its operation.

- Fugitive emissions –_Sulfur hexafluoride (SF_6) is used in insulation and current interruption applications (Madrigal & Fecher, 2010). SF_6 may escape as fugitive emissions during manufacturing, use, maintenance and disposal. The scale of SF_6 emissions will be dependent on the type, and number, of equipment used during operations, as well as the maintenance and recycling procedures employed during operation and decommissioning. A detailed estimate has therefore been excluded from the study.

  A report compiled by the United States Environmental Protection Agency (EPA, 2012) estimates the total global SF_6 emissions by country and region. Their estimates include all components, as well as emissions from manufacturing and disposal. The report estimated an Emission Factor of 2.45 kg CO_2e/MWh for SF_6 fugitive emissions for Africa as a whole.
- Corona discharge - High voltage transmission lines can emit nitrous oxide (N_2O) known as Corona Discharge. Corona discharges are highly uncertain and estimated to comprise between 1-3 kg CO_2e/MWh.
- Technical loss reduction - When considered along the entire line, this is the most common positive impact associated with transmission projects. This will result in more power being delivered to the consumer (refer to Section 2.3).
- Expanded distribution capacity - Capacity must increase, along with greater demand, as economies grow, and will certainly be accompanied by an increase in power generation capacity which could be associated with larger grid emissions. If additional power generation is derived from renewable resources, regional emissions will be less, and will support countries in meeting development and mitigation targets (refer to Section 2.3).

6.2.1.3.1.5 Reporting thresholds

The IFC's PS 3: Resource Efficiency and Pollution Prevention defines reporting thresholds for annual GHG emissions of 25 000 tCO_2e (IFC, 2012). Should this threshold be exceeded, it is a requirement to consider feasible alternatives for reducing project-related GHG emissions.

The same threshold has also been adopted by the European Bank for Reconstruction and Development (EBRD) as of 2014.

It should be noted that the reporting thresholds, and subsequent requirements, primarily apply to projects that exceed the specified threshold on an annual basis during operation. The GHG emissions from the construction phase are deemed to be insignificant.

6.2.1.3.1.6 Impact assessment

The measurement of GHG emissions produced directly or indirectly by the project is expressed in terms of the project's carbon footprint. This can then be considered in the context of the project's contribution to global climate change.

The GHG impact significance rating of the ANNA transmission line is based on the magnitude of the GHG emissions. Where traditional ESIAs rate significance as being based on the combined effect of the likelihood and the magnitude of an impact, the concept of likelihood is irrelevant in the context of GHG emissions since increased GHG emissions will result from project implementation.

With the construction phase having an overall negative impact with respect to GHG emissions, it is important to consider the contextual factors relating to the Angolan energy landscape along with the country's national development objectives and position on climate change mitigation. The project aligns with key national objectives related with provision of energy, development and long-term climate change mitigation for the concerned provinces, providing a strong rationale for the implementation of this project.

The potential impacts on climate change as a result of the increased emissions during construction, are described below:

Table 6.5: Construction Impact: Increased GHG emissions

Phase	Construction
Impact description	The embodied emissions of construction material are likely to be a significant contributor to GHG emissions for a transmission project involving extensive infrastructure relative to the amount of power being delivered, as is generally the case with long-distance transmission lines. The assessment performed highlights the following, with regards to the magnitude of the project GHG emissions. Construction phase emissions were estimated based on construction-focussed activities and materials, excluding land use change, with GHG emissions totalling 579 865.23 tonnes of CO_2e for the transmission line to be constructed in Angola (and 80,625.49 tonnes CO_2e for construction in Namibia), divided in the following items: • Plant and equipment – diesel - 223 235.73 tonnes CO_2e (38%) • Steel: General - UK (EU) Average Recycled Content - 192 049.45 tonnes CO_2e (33%) • Aluminum: General - 68 614.02 tonnes CO_2e (12%) • Site accommodation : Diesel - 30 985.40 tonnes CO_2e (5%) • Concrete: XC2 - 18 686.80 tonnes CO_2e (3%) • Steel: Bar & rod - UK (EU) Average Recycled Content - 3 191.01 tonnes CO_2e (1%) • Personnel travel (estimated)--195.39 tonnes CO_2e (0%) • Sheet piling: medium use - 42.61 tonnes CO_2e (0%) • Clay: general (simple baked products) - 41.07 tonnes CO_2e (0%) • Land Clearing - 42 823.75 tonnes CO_2e (7%) • **Total**: 579 865.23 tonnes CO_2e The IFC's PS3: Resource Efficiency and Pollution Prevention defines reporting thresholds for annual GHG emissions of 25 000 tCO_2e, as these are considered significant. The project emissions during construction exceed this annual threshold and are therefore considered to be significant. Note that other banks may have their own respective reporting thresholds which should be applied if relevant.
Mitigation measures	Mitigation potential is limited during the construction phase, as most of the carbon footprint results from embodied emissions from construction materials, transport and mobile fuel combustion. Measures proposed are: • The development of a dedicated GHG management plan, which is critical if the GHG emissions from the project is to be effectively managed over time. Key elements of a GHG management plan for this project should include: - Development of a policy statement indicating the infrastructure owner/implementing agency's commitments with regards to the reduction of GHG emissions and the implementation of the required mitigation measures. - Development of annual carbon footprint assessments, which will require an appropriate data capturing and management system to support monitoring and evaluation. - The establishment of short, medium and long-term GHG emission targets. Targets should be in line with national mitigation objectives and will allow performance to be monitored. - Identification of a maintenance practice and process that assists in the reduction of lifetime GHG emissions. • The choice of technology, equipment and materials, and from where they are sourced, have the potential to make significant contributions to the reduction of project emissions across the entire lifecycle. This entails: - Exploring alternative construction technologies and equipment that have lower carbon footprints and a reduced risk of fugitive emissions. - Alternative construction materials with lower embodied emissions. - Fuel-efficient construction equipment and vehicles. - Making use of locally-sourced materials, reducing the need to transport materials over long distances. - Eliminating the need for certain materials or making use of recycled materials.

Phase	Construction	
	- Adequate planning and efficient use of materials can also help further reduce the project's carbon footprint. - Section 6.2.1.3.1.3 provides a summary of the most significant contributors to GHG emissions during construction, which can be referenced to ensure areas of high impact are being prioritised for intervention. • Waste minimisation and management, which could include: - The efficient use of new materials and the minimisation of waste sent to landfill can be achieved by taking the following steps: - Reducing complexity within the design. - Careful specification of materials to avoid wastage. - Avoiding changes to the design that results in wastage, by setting clear objectives and requirements from the outset. - Avoiding damage to materials during transport, storage and fitting. - Effective communication between design team, procurement and contractors. - Using materials with a recycled content where possible. • Management of land use change emissions (also included in Sections 6.2.4.2.3 and 6.3.1): - Actively minimise land clearing during construction as identified. - Rehabilitate land and vegetation temporarily disturbed during construction. • Alternative fuels - biodiesel can be considered for mobile combustion, such as on-site power generation and the transport of materials and workers.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Permanent**	**Permanent**
Extent	**International**	**International**
Magnitude	**Moderate**	**Moderate**
Significance	**MODERATE (-)***	**MODERATE (-)***
Probability	**Certain / definite**	**Certain / definite**
Confidence	**High**	**Medium**
Reversibility	**High**	**Medium**
Resource irreplaceability	**High**	**Medium**
Comment on significance	*According to the climate change assessment performed, in the context of climate change impacts resulting from GHG emissions, magnitude is the primary criteria used to assess impact significance. The other criteria are all the same, irrespective of project context and scale of GHG emissions, and do not present a good basis on which to assess the significance of impacts. GHG impacts occur on a global scale, with the duration being largely permanent and, with the large body of scientific research linking GHG emissions to climate change, the probability of impact is assumed to be definite. Magnitude is gauged through the application of reference benchmarks. Alignment with national climate change policies are also taken into consideration. On this basis, although the automated calculation of impact is major (-), the environmental assessment practitioner has revised this to moderate (-).	
Cumulative impacts	The potential for cumulative climate change impacts exists, and is rated moderate (-).	

The potential impacts of the increased emissions during operation on climate change, are described below:

Table 6.6: Operational Impact: Increased GHG emissions

Phase	Operation
Impact description	GHG emissions for the operational phase, were not calculated. Considering the nature of the project, operational emissions are unlikely to be significant if appropriately managed and if proper maintenance practices are implemented to

Phase	Operation	
	ensure emissions are kept to a minimum. Emissions likely to be generated by the project include: fugitive emissions, corona discharge, technical loss reduction and expanded distribution capacity (refer to Section 6.2.1.3.1.4). The IFC's PS 3: Resource Efficiency and Pollution Prevention defines a threshold for annual GHG emissions of 25,000 tCO_2e. Should this threshold be exceeded, it is required to consider feasible alternatives to reduce project-related GHG emissions. These thresholds and subsequent requirements apply primarily to projects that exceed the specified threshold on an annual basis during operation. It is not likely that this project will exceed this, as the emissions are limited, as described above. Note that other banks may have their own respective reporting thresholds which should be applied if relevant.	
Mitigation measures	• Development of a dedicated GHG management plan for the project. Key elements of the GHG management plan for the ANNA transmission line should include: - Developing a policy statement indicating the infrastructure owner/implementing agency's commitments with regards to reducing GHG emissions and implementing the required mitigation measures. - Development of annual carbon footprint assessments, which will require an appropriate data capturing and management system to support monitoring and evaluation. - The establishment of short, medium and long-term GHG emission targets. Targets should be in line with national mitigation objectives and will allow performance to be monitored. - Identify maintenance practices and processes that help reduce lifetime GHG emissions. • Technology equipment and materials, this could include undertaking of maintenance schedules and employing maintenance practices and processes, aimed at minimising project GHG emissions. • Waste minimisation and management, this could include the efficient use of new materials and minimisation of waste sent to landfill by taking the following steps: - Reducing complexity within the design. - Careful specification of materials to avoid wastage. - Avoid changes to the design resulting in wastage by setting clear objectives and requirements from the outset. - Avoid damage to materials during transport, storage and fitting. • Alternative fuels - biodiesel can be considered for transport of replacement materials and workers.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Permanent**	**Medium term**
Extent	**International**	**International**
Magnitude	**Moderate**	**Very low**
Significance	**MODERATE (-)**	**MODERATE (-)**
Probability	**Almost certain / Highly probable**	**Certain / definite**
Confidence	**High**	**Medium**
Reversibility	**High**	**High**
Resource irreplaceability	**High**	**Low**
Comment on significance	No additional comments.	
Cumulative impacts	The potential for cumulative climate change impacts exists and is rated as moderate (-).	

6.2.1.3.2 Impact of climate change on the project

6.2.1.3.2.1 Overview

Climate change has the potential to negatively impact electricity supply through an increased demand and a reduced efficiency of generation and transmission capacity[1]. Extreme temperatures and dry spells are likely to increase in frequency and intensity in coming decades. As a result, energy infrastructure could face climatic stressors far more regularly, with the potential of compromising design thresholds, leading to failure of, or a reduction in, operational efficiency.

Although not directly impacting on transmission infrastructure, increased temperatures and dry spells have the potential to affect cooling systems and the efficiency of certain generation technologies. This must be noted, as it will occur simultaneously with impacts affecting transmission. Although studies have assessed the potential impacts of climate change on power generation, the potential impacts of transmission networks and peak electricity loads have received less attention[2].

The primary climate change risk posed to transmission infrastructure relates to an increase in extreme temperatures. It is accepted that increased ambient air temperatures reduces the carrying capacity of transmission networks, but current practice is to rate the carrying capacity of transmission lines by basing calculations on historical climate data. The failure to account for the variability and increases in temperature linked to climate change could compromise the reliability or future electricity supply.

To date, very few studies exist which aim to estimate or determine the impact of increased temperatures on transmission capacity. Transmission capacity, and losses, are also influenced by a wide range of non-climatic factors such as conductor technology. Accordingly, it is difficult to assign values to the likely losses which may be incurred due to increased temperatures.

Although impacts and losses may vary, it is accepted that all transmission lines will experience reductions in carrying capacity when exposed to projected temperature extremes. Electrical power cables suffer decreased transmission capacity as the temperature of the conductor increases. A portion of these capacity losses result from increased electrical resistance at higher conductor temperatures. The current-carrying capacity of a transmission line is primarily limited by the conductor's maximum allowed operating temperature[3]. Maximum operating temperatures are prescribed for different types of conductors to ensure compliance with clearance regulations and to prevent damage to the conductor and other line hardware. Continued operation beyond a conductor's maximum operating temperature can result in excessive sag or damage. To avoid surpassing a transmission line's maximum operating temperature, operators typically curtail the current in an at-risk conductor in order to satisfy thermal limits. The most significant impact will be on high voltage lines, due to their larger diameter and porter heat dissipation, particularly during periods of peak load. Depending on demand, this may require additional generation capacity to compensate for transmission-related losses. Additional temperature-related risks includes damage due to excess sag, permanent damage due to the exceedance of safe operating thresholds and, in extreme cases, wildfire ignition as a result of line sag. The primary potential impacts on the energy sector, as a result of climate change, are outlined in Figure 6.2 and Figure 6.3.

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1 Sathaye J, Dale L, Larsen P, Fitts G, Koy K, Lewis S and Lucena A. 2011. Estimating risk to California Energy Infrastructure from Projected Climate Change, CEC Publication CEC-500-2012- 057

2 Bartos et al. 2016. Impacts of rising air temperatures on electric transmission ampacity and peak electricity load in the United States. Environ. Res. Lett. 11 (2016) 114008

3 IEEE Standard for Calculating the Current-Temperature Relationship of Bare Overhead Conductors 2013 IEEE Std 738- 2012 (Revision of IEEE Std 738-2006—Incorporates IEEE Std 738-2012 Cor 1-2013)

Climate change	Potential impact
Increased water temperatures	• Reduced generation efficiency • Increased risk of exceeding thermal discharge limits
Increased air temperatures	• Reduced generation efficiency and outputs • Increased peak demands, stressing generation capacity and distribution networks • Reduced transmission efficiency
Reduced water availability (surface and groundwater)	• Adverse impact on hydro-power generation • Reduced water availability for cooling systems in thermal and nuclear power plants • Reduction in generation capacity and production
Extreme weather events	• Reduced supply quality of fuel (coal, oil, gas) • Reduced input of energy (e.g. water, wind, sun, biomass) • Damage to generation and transmission infrastructure • Reduced output and impaired security of supply
Variations in wind patterns (not limited to climate change)	• Reduced outputs and stability of grids relying heavily on renewable energy • Physical damage to infrastructure

Figure 6.2 Climate change projections and potential impacts on the energy sector

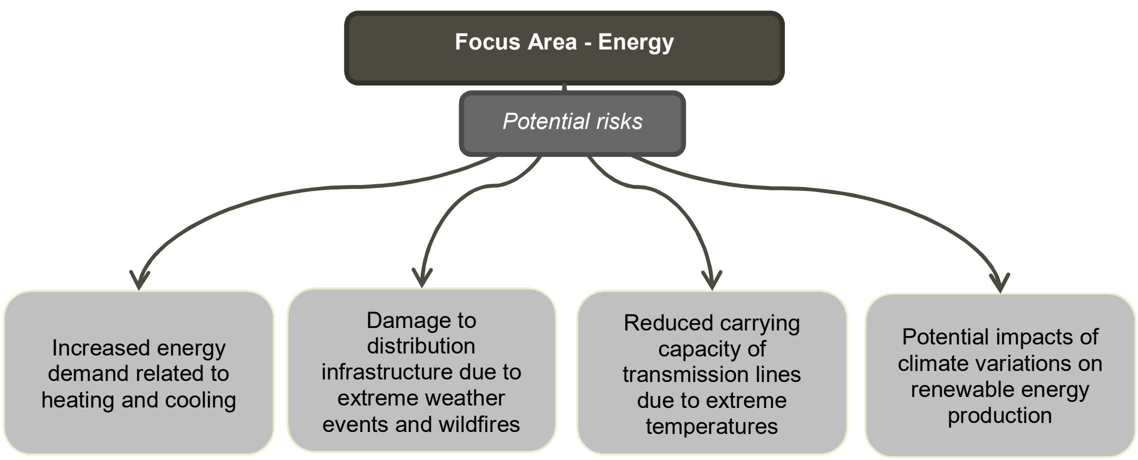

Figure 6.3: Climate change potential risks within the energy sector

There is a need to differentiate between direct and indirect climate change-induced impacts on the energy sector as a whole.

Direct impacts include	Indirect impacts include
• Reduced energy resource availability • Reduced power production	• Competition for shared resources • Altered supply and demand trends

Figure 6.4: Direct and indirect climate change impacts on energy sector

Direct impacts are generally more visible, but the cost of indirect impacts may exceed direct losses in the long run. Along with the expected demand for energy, price increases are also anticipated. A variety of climate change variables are expected to increase energy demands as heating and/or cooling requirements change, compounding the existing pressures on electricity supply and infrastructure.

While there is generally less research on the impact of climate change on transmission lines than on electricity generation, it is accepted that there are distinct impacts, which are summarised in Table 6.7 and discussed in detail below.

Table 6.7: Key climate impacts on transmission lines

Climate hazard/ risk	Components at risk	Potential key impact	Adaptation strategies
Increased temperatures	• Transmission lines • Transformers, inverters and cables	• Reduced carrying capacity of transmission lines and conductors under high temperatures • Higher peak loads • More frequently exceedance of maximum operating temperature • Excess sag	• Heat resistant • materials • Cooling measures for transformers
Increased precipitation	• Transmission lines • Substations	• Flooding of ground level infrastructure • Damage to infrastructure due to soil erosion	• Improved flood protection for ground-level equipment and infrastructure

6.2.1.3.2.2 Impact assessment

The potential impacts of climate change on the project, in terms of increased temperatures and their impact on personnel, both during construction and operation, are described below.

Table 6.8: Construction Impact: Increased temperatures on personnel

Phase	Construction	
Impact description	Increasing temperatures (including increased averages, increased temperature profile, heatwaves, and extreme temperature days), have the potential to result in heat stress of workers on site. Indirect impacts could include potential delays in construction.	
Mitigation measures	Establish a heat stress prevention program; provide water for staff; provide training on heat stress; include frequent breaks in construction schedules; ensure protective clothing is provided and worn.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Short term**	**Short term**
Extent	**Local**	**Local**
Magnitude	**Low**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**

Phase	Construction	
Probability	Almost certain / Highly probable	Probable
Confidence	Medium	Medium
Reversibility	High	High
Resource irreplaceability	Medium	Low
Comment on significance	No additional comment.	
Cumulative impacts	None	

Table 6.9: Operational Impact: Increased temperatures on personnel

Phase	Operational	
Impact description	Increasing temperatures (including increased averages, increased temperature profile, heatwaves, and extreme temperature days) have the potential to result in heat stress of personnel undertaking maintenance and inspections along the line. Indirect impacts could include an increased absenteeism rate of staff and a resultant increased cost of operation.	
Mitigation measures	Establish a heat stress prevention program; provide water for staff; provide training on heat stress; include frequent breaks in construction schedules; ensure protective clothing is provided and worn.	
	Without mitigation	With mitigation
Nature	Negative	Negative
Duration	Long term	Long term
Extent	Local	Local
Magnitude	Low	Very low
Significance	MINOR (-)	MINOR (-)
Probability	Almost certain / Highly probable	Probable
Confidence	Medium	Medium
Reversibility	High	High
Resource irreplaceability	Medium	Low
Comment on significance	No additional comment.	
Cumulative impacts	None	

The potential impacts of climate change on the project, in terms of the impact of increased temperatures on infrastructure, is described below.

Table 6.10: Operational Impact: Increased temperatures on infrastructure

Phase	Operational
Impact description	Increasing temperatures (including increased averages, increased temperature profile, heatwaves, and extreme temperature days) have the potential to result in a more frequent exceedance of maximum operating temperature and a reduced carrying capacity of transmission lines and conductors. This is coupled with potential higher peak loads caused by the cooling demands of users. However, due to the current capacity of the grid in this location, there is a very low likelihood of this impact being realised. Infrastructure components are already designed to accommodate a higher heat threshold and therefore no design-related measures such as heat-resistant materials, cooling for transformers and heat dissipation for conductors, are recommended in addition.

Phase	Operational	
Mitigation measures	Should this impact situation arise, which is unlikely, demand management will help to effectively address the reduction in efficiency.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Immediate**	**Immediate**
Extent	**Local**	**Local**
Magnitude	**Low**	**Low**
Significance	**NEGLIGIBLE (-)**	**NEGLIGIBLE (-)**
Probability	**Unlikely**	**Unlikely**
Confidence	**High**	**High**
Reversibility	**High**	**High**
Resource irreplaceability	**Low**	**Low**
Comment on significance	No additional comment.	
Cumulative impacts	None	

The potential impacts of climate change on the project, in terms of high rainfall intensity and the associated impact on infrastructure, is described below.

Table 6.11: Operational Impact: High rainfall intensity on infrastructure

Phase	Operational	
Impact description	High rainfall intensity, and related events, could increase the risk of flooding and soil erosion, with associated damage to infrastructure.	
Mitigation measures	• Improved flood protection for ground-level equipment and infrastructure, mainly substations and pylons located in steep areas. This is likely to be included in the design specifications. • Forecasting to help with preparedness. • Setting up of rapid emergency repair teams to attend to damaged infrastructure to limit the impact on operations and to ensure continuity.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Brief**	**Brief**
Extent	**Local**	**Local**
Magnitude	**Moderate**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Almost certain / Highly probable**	**Probable**
Confidence	**Medium**	**Medium**
Reversibility	**Medium**	**Medium**
Resource irreplaceability	**Medium**	**Low**
Comment on significance	No additional comment.	
Cumulative impacts	Not applicable.	

6.2.1.4 No-Go alternative

The project will inevitably result in increased GHG emissions across the entire project lifecycle, while the construction phase will have a limited time horizon. Operational activity will cause emissions but, with adequate management measures in place, direct emissions could potentially be maintained below the 25 000 tCO_2e per annum reporting threshold over the long term. The strategic significance of the ANNA transmission line in supporting national development goals and renewable energy objectives in both Angola and Namibia, is unmistakable and, in appreciation of this broader context, the project should continue. The No-Go alternative would forego such an opportunity and it is therefore not supported.

6.2.1.5 Summary

Climate change-related impacts are twofold: the impacts of the project on climate change, as well as the impact of the projected climate change scenarios on the project. In terms of impacts on climate change, the main emissions are generated at the construction phase due to the embodied emissions of materials, i.e. all the emissions emitted to produce a material, and the vehicles and machinery used during construction. Mitigation includes deliberate choice of technology, equipment and materials with the aim of reducing impacts, minimising and managing waste, managing land use change emissions and using alternative fuels. During operation, the impacts are less significant and likely to remain below the threshold for IFC reporting. Mitigation in this regard includes maintenance schedules for equipment and materials to minimise emissions, as well as waste minimisation and management and the use of alternative fuels. These impacts have been assessed as being of moderate negative significance, both before and after mitigation. A GHG management plan is recommended to effectively manage emissions over the lifecycle of the project. Impacts of climate change on the project include the effect of increasing temperatures on personnel during the construction and operation phases, and the effect of increasing temperatures and a high rainfall intensity on infrastructure during the operational phase. These are all rated as of negative negligible or minor significance, before mitigation, and of negligible or minor significance after mitigation. Mitigation includes the establishment of a heat stress prevention program for construction and maintenance personnel, demand management (in the unlikely event of capacity issues), improved flood protection design of infrastructure, forecasting of events and rapid emergency repair teams.

6.2.2 Geology and geomorphology

6.2.2.1 Overview

The potential negative impacts on Geology and Geomorphology, despite their minor significance, are concentrated in the construction phase. No relevant impacts are expected during the operational phase.

Earthworks, and other construction activities, associated with creating and/or upgrading access routes, construction of pylons (foundations), construction camps and substations, have the potential to affect geological outcrops.

The area of influence of potential impacts is expected to be small but may exceed the IAI and have regional implications. This is related either to the potential need for material from borrow pits located outside of the study area, or to the possibility of depositing surplus soil from excavations in locations outside the boundary of the study area. The minor significance of the identified impacts is due to the following:

- The project typology/layout implies that there will be no relevant geomorphological changes;
- The lithology found in the study area is quite common in the region, with outcrops present in the wider vicinity of the IAI;
- There is no occurrence of classified geological heritage within the limits of the study area, and the field surveys corroborate this lack of geological and/or geomorphological singularities;

- No active quarries and/or mines have been identified within the DAI. In addition, the website of the Angolan Government's Ministry of Mineral Resources and Petroleum[1] was consulted, which confirmed the absence of mining concessions in the study area.
- The study area runs through a low seismic risk region.

6.2.2.2 Potential impacts and mitigation measures

6.2.2.2.1 Impacts related to potential loss/change of geological resources

Potential impacts on geology are related to the earthworks needed for the installation of the construction site camps, the construction of substations, the opening of the pylon foundations and the construction/improvement of access roads. Expected impacts and recommended mitigation measures are listed in Table 6.12 (impacts of, and mitigation measures recommended for, the construction phase).

Table 6.12: Construction Impact: Potential loss/change of geological resources

Phase	Construction	
Impact description	Earthworks are not expected to be required on a large scale, considering the smaller volume of material expected to be moved, which will cause few geomorphological changes in the landscape. Digging holes for the pylon foundations will produce rock waste material for which a suitable destination must be found.	
Mitigation measures	• The earthworks for the installation of the campsites should be strictly contained to within the boundaries of the required area identified; • The rock waste from excavations for the pylon foundations should be reused as far as possible and the remainder should be deposited near the excavation area, with the least possible morphological impact; • If borrow pit material is necessary, priority should be given to using existing quarries; • If there is a need to dispose of waste rock material, these should be transported to officially-approved landfills, as close as possible to the construction site.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Short term**	**Immediate**
Extent	**Local**	**Local**
Magnitude	**Low**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Likely**	**Unlikely**
Confidence	**High**	**High**
Reversibility	**High**	**High**
Resource irreplaceability	**Low**	**Low**
Comment on significance	Impacts are expected to be very few and mitigation potential is high.	
Cumulative impacts	Cumulative geological 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.	

1 Ministério dos Recursos Minerais e Petróleos

6.2.2.2.2 Chemical contamination of geological materials

The potential impacts on geology, resulting from chemical contamination, are mainly associated with the construction phase and are listed in Table 6.13. The vulnerability of coarse sedimentary materials, which corresponds to an extent of approximately 210 km (58% of the project corridor in Angolan territory), provides some relevance to this issue.

Table 6.13: Construction Impact: Chemical contamination of geological formations

Phase	Construction	
Impact description	During the construction phase, diverse machinery and a diverse set of potentially polluting substances, will be present on the construction site. The following substances are noteworthy: fuels, lubricating oils, solid wastes (e.g. packaging), wastewater and cement/concrete. By accident/incident or mismanagement, these substances can be absorbed into the soil, seeping into deeper and harder-to-reach levels.	
Mitigation measures	• The concrete batch plants should be kept to a minimum and installed on impermeable platforms; • The storage of fuel and other hazardous materials must be done only on the surface (i.e. no underground storage), in an impermeable storage facility, with peripheral drainage and equipped with an oil collector; • Equipment maintenance should preferably take place in workshops located in Lubango or Cahama; • Ensure that emergency spill kits are present at strategic locations, each one allocated to a responsible and capable person/people with the necessary training to be able to use it in the case of accidental spillages; • Contractors should instruct their staff to prohibit the disposal (insertion/ injection) of any type of waste into open fractures/faults exposed to the surface of the ground (applicable to project sections on igneous or metamorphic rock); • Ensure an immediate response to any spillage/leakage; • Contaminated geological materials should be handled as hazardous waste and transported and disposed of in accordance with best practices and Angolan law; • Oil waste should be periodically removed from the oil collector and sent to a final destination by an authorised waste operator; • Washing of concrete mixers should only take place near the pylons´ foundations, thus minimising the scattering of cement.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Short term to permanent1**	**Immediate**
Extent	**Local**	**Local**
Magnitude	**Low**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Likely**	**Unlikely**
Confidence	**Medium**	**Medium**
Reversibility	**Medium to High2**	**High**
Resource irreplaceability	**Low**	**Low**
Comment on significance	Impacts are expected to be very few, and mitigation potential is high.	
Cumulative impacts	Given the specificity of the project, and the fact that no other large-scale construction projects are known for the surrounding region (e.g. urbanization, roads), cumulative impacts are not considered to be significant.	

1 Dependent on the hazardous substance.
2 Dependent on the spillage volume, the soil permeability and on the response time.

Table 6.14: Operational Impact: Chemical contamination of geological formations

Phase	Operational	
Impact description	During the operation phase, the potential impacts are associated with unsafe storage and/or application/use of fuel and lubricating oils in the Cahama substation.	
Mitigation measures	• The storage of fuel and other hazardous materials must be only on the surface (i.e. no underground storage), at an impermeable storage facility, with peripheral drainage and equipped with an oil collector; • Equipment maintenance should preferably take place in workshops located in Lubango or Cahama; • Ensure that emergency spill kits are present at strategic locations and each one allocated to a responsible and capable person/people with the necessary training to be able to use it in the case of accidental spillages. • Oil waste should be periodically removed from the oil collector and sent to a final destination by an authorised waste operator.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Short term to permanent1**	**Immediate**
Extent	**Local**	**Local**
Magnitude	**Low**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Likely**	**Unlikely**
Confidence	**Medium**	**Medium**
Reversibility	**Medium to High2**	**High**
Resource irreplaceability	**Low**	**Low**
Comment on significance	Very few impacts are expected, and mitigation potential is high.	
Cumulative impacts	Given the specificity of the project and the fact that no other large-scale construction projects are known for the surrounding region (e.g. urbanisation, roads), cumulative impacts are not considered significant.	

6.2.2.3 No-Go alternative

In the non-implementation scenario, the geological processes will continue dynamically, which is as a result of the balance between the internal and external geodynamic agents.

6.2.2.4 Summary

Most of the potential impacts on Geology and Geomorphology will occur during the construction phase, as a result of the earthworks that will be required to erect the constructions camps, and create road access routes and the foundations for the pylons.

The expected impacts are divided into two major groups:

- Physical (volumetric) impacts related to the removal of geological materials from a given location and the deposition of these same materials in a different location to their source; and
- Chemical (organic and inorganic) impacts related to the presence of hazardous substances (e.g. fuels and oils) required for project implementation.

With effective implementation of the proposed mitigation measures, no significant impacts are expected.

1 Dependent on the hazardous material.
2 Dependent on the spillage volume, the soil permeability and on the response time.

6.2.3 Water resources

6.2.3.1 Overview

Construction and operation activities may have impacts on both surface and underground water resources and relate to quantitative and qualitative aspects. Most of the resident population within the limits of the study area is dependent on groundwater resources, namely as a source of drinking water (ingestion).

Aquifer productivity is quite variable, mainly due to the lithological differences present in the study area, but also due to the variation of the average annual precipitation and the different recharge rates of aquifers. In terms of surface water resources, the following aspects are emphasised:

Approximately 20 dams/ reservoirs/ ponds (mostly “chimpacas”) were identified within the limits of the study area, mostly with a small water storage capacity (i.e. less than 5 ha in size);

The project corridor crosses at least 29 watercourses, with very distinct watershed areas, oscillating between basins with drainage areas of less than 5 km^2, and the Caculuvar River, close to Cahama, with an upstream drainage basin of 9 000 km^2.

Between Cahama and the Calueque region, the project corridor crosses approximately 11 pools (shallow, mildly-depressed areas that are flooded in the rainy season) and six mulolas (wide valleys in association with dry or sporadically flowing watercourses). Within the DAI, these water features have lengths from 900 m to 4300 m, which need to be crossed.

6.2.3.2 Potential impacts and mitigation measures

6.2.3.2.1 Groundwater contamination

Potential impacts on groundwater quality can have multiple origins (Table 6.15).

Table 6.15: Construction Impact: Groundwater contamination

Phase	Construction
Impact description	Construction sites involve the handling of a range of potentially-polluting substances such as fuels, oils, solid waste, domestic effluent and concrete mixer washwater. Accidental spills of fuel, the leaching of hazardous substances from unsuitable packaging/containers, domestic effluent from toilets and wash areas (showers, kitchens and laundry), and water from washing of concrete mixers, are factors that contribute to the degradation of groundwater quality.
Mitigation measures	Chemical handling/spillages: • Ensure compliance with international good practice guidelines[1] when installing and operating fuel storage facilities for fuel and other hydrocarbon storage - these standards make provision for observation wells, leak detectors, overfill protectors, etc; • Ensure chemicals are stored and handled according to international good practice guidelines[2]; • Ensure emergency spill kits are present at strategic locations, with responsible and capable people with the necessary training to use it in the case of accidental spillages; • Ensure oily wastewater from washbays undergo treatment in an oil separator before being discharged to a lined detention pond and, eventually, into the 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; • The oily layer that is stored in a suitable container must be sent to an authorised waste operator, who must ensure that the oil’s final destination prevents contamination of the water environment; and

1 For example South African Bureau of Standards (SABS) 089, 1535, 0131, 0108 and 0400 could be used.
2 For example the European Chemicals Agency in the form of the Regulatory Framework for the Management of Chemicals (REACH).

Phase	Construction	
	• Relevant departments, and other emergency services, will be contacted in order to deal with spillages and the contamination of aquatic environments. Wastewater: • All wastewater from site camp activities will be collected and removed from the site for appropriate disposal at a licenced municipal facility; • 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; • These toilets must be used at all times, and no indiscriminate use of the bush for ablutions will be permitted; • The following is required for chemical toilets: - Toilets may not be located within 100 m of any watercourse; - Toilets must be secured to the ground to prevent toppling over (e.g. by wind); - Ensure no spillage when toilets are emptied; - Ensure toilets have an external closing mechanism to prevent paper blowing out when not in use; - Toilets are to be locked when workers are not on site; - Toilets must be serviced regularly, and the ECO should inspect them; • Wastewater from the construction sites should be sent to a compact (secondary treatment) Waste Water Treatment Plant (WWTP) prior to its release into the surrounding water environment; and • A copy of the waste disposal certificates must be obtained. Cement/concrete batching: • Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the RNT Project Manager. • Natural storm water runoff not contaminated during the development and clean water can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and support by the ECO. • The impermeable surface that forms the basis of the concrete plant should be slightly raised above the surrounding terrain to minimise the entry of clean runoff water into the construction area. • Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO. • 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. • Water contaminated with excessive suspended solids (mainly silt and clays) can only be released into the natural drainage basins after effective treatment in settling ponds, ie in compliance with the Angolan legislation to comply with the concentration of 200 mg / L of TSS.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Short to long term[1]**	**Immediate**
Extent	**Local to municipal**	**Local**
Magnitude	**Negligible to Moderate**	**Negligible to Very low**
Significance	**MINOR TO MODERATE (-)**	**NEGLIGIBLE (-)**
Probability	**Most Likely**	**Likely**

1 Dependent on the hazardous substance.

Phase	Construction	
Confidence	High	High
Reversibility	Medium	High
Resource irreplaceability	Medium	Medium
Comment on significance	There is a high potential for effective mitigation with the implementation of the recommended environmental management measures.	
Cumulative impacts	Given the specificity of the project, and the fact that no other large-scale construction projects are known for the surrounding region (e.g. urbanisation, roads), cumulative impacts are minor. However, it is important to refer to the presence of large-scale agricultural farms, mainly in the Cunene Province, the activities of which, particularly the use of pesticides, can induce impacts on water quality. Considering the type of intervention proposed for the ANNA project (use of pesticides as a last resort, and only punctually), the expected cumulative impacts are considered as being minor.	

Table 6.16: Operational Impact: Groundwater contamination

Phase	Operational	
Impact description	During the operational phase the potential impacts on groundwater quality relate to: • Substation maintenance operations, involving the handling of lubricating oils and fuel; • Maintenance of servitude accesses, which may include reprofiling and/or paving; and • Vegetation clearance around pylons and servitude access.	
Mitigation measures	• Maintenance operations on substations involving the handling of oils and/or fuels and other hazardous substances must be undertaken on an impermeable base, with peripheral drainage and equipped with an oil collector; • Heavy machinery involved in the improvement of access routes should be up to date with services ensuring it is mechanically sound, thereby minimising the likelihood of oil and/or fuel leaks; • Similarly, fuel transfer or oil change operations must be performed on an impermeable surface. In the event of a spill, this material must be properly stored and transported to an authorised destination; and • Vegetation clearance should preferably be mechanical/manual. If there is a need for herbicide application, compliance with best practices and standards (namely the IFC EHSG) must be ensured. No application of herbicides in rainy periods should be allowed, as rainy conditions increases the extent to which the herbicide is spread, on the surface as well as absorbed in the soil .	
	Without mitigation	With mitigation
Nature	Negative	Negative
Duration	Brief to short term	Immediate
Extent	Local	Limited
Magnitude	Low to Moderate	Very low
Significance	MINOR (-)	NEGLIGIBLE (-)
Probability	Likely	Unlikely
Confidence	Medium	Medium
Reversibility	Medium	High
Resource irreplaceability	Medium	Medium
Comment on significance	The potential for effective mitigation is high with the implementation of environmental management measures.	
Cumulative impacts	Given the specificity of the project, and the fact that no other large-scale construction projects are known for the surrounding region (e.g. urbanisation, roads), cumulative impacts are minor. However, it is important to refer to the presence of large-scale agricultural farms, mainly in the Cunene Province, the activities of which, particularly	

Phase	Operational
	the use of pesticides, can induce impacts on water quality. Considering the type of intervention proposed for the ANNA project (use of pesticides as a last resort, and only punctually), the expected cumulative impacts are considered to be minor.

6.2.3.2.2 Drawdown of aquifer levels

Potential impacts on groundwater resources, in terms of volume, are described in Table 6.17.

Table 6.17: Construction Impact: Quantitative impacts on groundwater resources

Phase	Construction	
Impact description	To supply the water needs of the construction camps, vertical boreholes, equipped with submersible pumps, may have to be constructed. The significance of this impact depends on the location of the boreholes and is mainly related to aquifer productivity and the proximity of, and hydraulic relationship with, surrounding groundwater abstraction activities.	
Mitigation measures	• Register the proposed boreholes within the National Institute of Water Resources of Angola (INRH), and obtain the required Titles of Use of Water Resources (TURH); • Install water meters in the boreholes and monitor daily, or weekly, water consumption; • In each of the constructed boreholes, a high-density polyethylene (HDPE) pipe should be installed to allow periodic measurement of levels (hydrostatic and hydrodynamic); • Conduct an exhaustive inventory of all groundwater sources around each borehole constructed for the present project (minimum 500m survey radius); • Monitor the drawdown that is caused by the project's boreholes on the groundwater resources within the immediate vicinity of each borehole; • If excessive drawdowns are detected, lower extraction flow rates should be considered and/or other borehole(s) should be installed further away from the existing boreholes; • Rational use of water should be ensured by: - Regular maintenance of adduction piping and quick detection and resolution of leaks; - Reuse of wastewater whenever possible (e.g. spraying of dirt roads to reduce dust concentration in the air); - Use of pressure machines when washing equipment; and - Continuous training of staff regarding minimising water wastage.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Undefined**	**Undefined**
Extent	**Limited**	**Limited**
Magnitude	**Low**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Likely**	**Unlikely**
Confidence	**Medium**	**Medium**
Reversibility	**High**	**High**
Resource irreplaceability	**Medium**	**Medium**
Comment on significance	The potential for mitigation is high if groundwater management measures are implemented, such as extraction flow rates, and number and location of groundwater abstraction points (vertical holes).	
Cumulative impacts	This project is not expected to require a large quantity of groundwater. The most significant water requirements will be confined to the construction phase, and will	

Phase	Construction
	therefore be of a temporary nature. Potential cumulative impacts will be related to large irrigated farms that use groundwater as a source of water.

6.2.3.2.3 Potential impact on surface water resources (drainage lines/rivers and flood areas)

Impacts on surface water resources (drainage lines/rivers and temporarily flooded areas) likely to occur during the construction phase, are listed in Table 6.18. This table lists a set of measures intended to minimise identified impacts. Note that the differences in rainfall and flow seasonality are relevant in the magnitude, duration and extent of potential impacts.

Table 6.18: Construction Impact: Surface water resources

Phase	Construction
Impact description	Surface water resources may be affected during the construction phase due to: • Consumption of surface water for industrial and/or domestic use; • Increased turbidity (total suspended solids) due to the movement of vehicles, heavy machinery and/or personnel; • Increased turbidity of water as a result of torrential runoff from affected areas (deforested) under this project; • Accidental spills of lubricants and/or fuels; • Contamination by poorly/insufficiently-treated wastewater; and • Intentional removal of water from puddles and/or muloles to dry out the excavations for the pylon foundations (during the wet season).
Mitigation measures	Mitigation measures proposed in Section 6.2.3.2.1 for groundwater contamination and Section 6.2.4.2 for soil protection is applicable, as well as the following: • If it is necessary to use water from a river or stream, it should be ensured that this extraction does not compromise ecological functions and/or other downstream uses; • The deforestation of riverbanks and riparian vegetation should be avoided at all costs; • No wastewater discharge into the drainage lines/waterbodies may occur without prior treatment (e.g. hydrocarbon separator, decantation/sedimentation pond, compact WWTP; etc.); • Natural stormwater runoff, uncontaminated by the development of this project, and clean water, can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and supported by the ECO. • Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and supported by the ECO. • There must be no impact on the long-term morphological dynamics of watercourses. • When working near a watercourse, the following must be taken into consideration: - No alteration of the bed, banks, course or characteristics of a watercourse. - Where earthworks are being undertaken in close proximity to a watercourse, slopes must be stabilised using suitable materials, e.g. sandbags or geotextile fabric, to prevent sand and rock from entering the channel. - Appropriate rehabilitation and revegetation measures of the watercourse banks must be implemented timeously. In this regard, banks should be appropriately and incrementally stabilised as soon as development allows. • Comply with Angolan legislation regarding concentration limits of discharges into natural water bodies (Annex VI of Presidential Decree no. 261/11 of 6 October); • Avoid the installation of pylons in flooded areas such as puddles and muloles; • If it is necessary for any morphological alteration in any watercourse, puddle (chana) or mulola, the morphology should be restored to its original state, as far as possible, once the intervention is complete, and an effective rehabilitation and revegetation operation should be undertaken;

Phase	Construction	
	• All construction support infrastructure must be placed at a distance of at least 50 m from the identified watercourses, puddles and mulolas; and • All construction camps, laydown areas, batching plants/areas, and any storage facilities, should be located outside of sensitive areas identified by the ecologist during the walk-down.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Brief to short term**	**Immediate**
Extent	**Local**	**Limited**
Magnitude	**Very low to Moderate**	**Negligible to Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Most Likely**	**Possible**
Confidence	**Medium**	**Medium**
Reversibility	**Medium**	**Medium**
Resource irreplaceability	**Medium**	**Medium**
Comment on significance	The potential for effective mitigation is high with the implementation of water resource management measures, particularly with regards to the extraction from watercourses.	
Cumulative impacts	This project is not expected to require a large quantity of surface water. The most significant water requirements will be confined to the construction phase, i.e. they will be reasonably temporary.	

Impacts on surface water resources (running water and temporarily flooded areas), likely to occur during the operational phase, are listed below in Table 6.19. The same table lists a set of measures to minimise identified impacts.

Table 6.19: Operational Impacts: Surface water resources

Phase	Operational	
Impact description	Surface water resources may be affected during the operational phase due to: • Accidental spillage of fuel from maintenance vehicles and/or lubricating oils for substations; and • An increased concentration of total suspended solids (TSS) with fine-grained material originating from the project's accesses within the servitude.	
Mitigation measures	• Locate and design permanent infrastructure to contain the long-term morphological dynamics of watercourses; • Stabilise the access road along the transmission line, where it crosses watercourses, with packed stones or develop concrete tracks if there is a risk of excessive erosion; • Ensure regular maintenance/services and periodic review of all vehicles and equipment involved in maintenance operations to minimise the probability of accidents/incidents; and • Monitor, at least annually, the project's access roads, and implement corrective actions if excessive erosion is identified.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Brief to Short term**	**Immediate to Brief**
Extent	**Limited**	**Limited**
Magnitude	**Very low to Moderate**	**Very low**
Significance	**NEGLIGIBLE TO MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Likely**	**Possible**

Phase	Operational	
Confidence	Medium	Medium
Reversibility	Medium	High
Resource irreplaceability	Medium	Medium
Comment on significance	The potential for effective mitigation is high with the implementation of a monitoring plan that allows for early identification of impacts.	
Cumulative impacts	No cumulative impacts are expected.	

6.2.3.3 No-Go alternative

In the scenario of non-implementation of the project, the quantitative aspect of water resources will remain as is, with current dynamics of runoff and infiltration, mainly dependent on the rainfall regime. In terms of consumption, demand may increase due to the increase of population and urbanised areas, but the main impact may derive from the implementation of large agricultural and/or livestock farming projects.

Regarding water quality, there is a high level of uncertainty for prospective scenarios. This uncertainty is mainly related to the unpredictability of the potential increase in irrigation areas in the Caculuvar and Cunene basins, as well as the uncertainty of implementing a basic sanitation network in Cahama, with an estimated population of around 70 000 inhabitants.

6.2.3.4 Summary

The water resources in the region should be considered a critical factor within the construction phase, considering the huge seasonal and inter-annual variability of water availability, as well as the fact that extreme drought conditions have been experienced in the Cunene Province within recent years.

Most of the potential impacts on water resources will occur during the construction phase, due to the presence of a significant number of people involved in the construction works, as well as the movement of machinery and equipment required for the construction of the transmission line and substations.

Expected impacts can be divided into two major groups, namely decreased water availability (surface and/or underground) and water contamination. Regarding the latter, three subgroups of potential outbreaks of contamination should be considered. These are: total suspended solids (mostly fine-grained inorganic material), domestic wastewater primarily from construction sites, and organic contaminants (fuel and/or oils and lubricants) resulting from accidental spills or improper handling.

With effective implementation of the recommended mitigation measures, no lasting or significant impacts are expected.

6.2.4 Soils and land use capability

6.2.4.1 Overview

Earthworks and other construction activities associated with the creation of new, or the improvement of existing, access roads, along with the construction of concrete foundations and the setup of construction camps, may negatively affect soils in a direct way. Other potential negative impacts, classified as indirect, may also occur, such as an increase in the concentration of total suspended solids (TSS) in waterways, or the deposition of dust (solid particles of fine-grade size) due to the movement of machinery and other construction activities.

Negative impacts on soils are expected to occur mainly during the construction phase. During the operational phase, no relevant impacts are expected. The direct area of influence of expected impacts is confined to the transmission line servitude.

The construction of the ANNA project will lead to changes in the current land use within the servitude area, and wherever new access roads need to be created. The construction of the Cahama substation will also mean that the existing land uses will need to give way to allow for this infrastructure. These negative impacts will occur in the construction phase and, in certain cases, will be permanent within the project's lifecycle.

6.2.4.2 Potential impacts and mitigation measures

6.2.4.2.1 Soil erosion and topsoil loss

Potential impacts related to soil erosion caused by wind and water, are listed in Table 6.20, for both the construction and the operational phases.

Table 6.20: Construction Impact: Soil erosion and topsoil loss

Phase	**Construction**	
Impact description	The clearing of vegetation, earthworks, the construction of new, or improvement of existing, access routes, and the construction of concrete foundations, will all result in a loss of vegetation and in the removal of topsoil. The operation of heavy machinery will compact soils. Vegetation clearing will also make soil more vulnerable to the erosive action of wind and water. Soil compaction reduces its permeability and therefore diminishes rainwater infiltration and increases runoff. Interventions in the vicinity of watercourses may increase the likelihood of sediment migration into them. Removal of topsoil may alter soil profile and turn soil rehabilitation more difficult.	
Mitigation measures	• Construction activities must be phased to minimise the area of disturbance at one time. • Vegetation must be cleared only immediately prior to construction works commencing to minimise the chance of exposing the soil to wind erosion. • Vegetation clearing at pylon sites must be kept to a minimum. Big trees with large root systems shall be cut manually and removed, as the use of a bulldozer will cause major damage to the soil when the root systems are removed. • Preserve existing vegetation where possible. • Areas having to be stripped of topsoil for construction purposes must be kept to a minimum and only stripped when work is about to take place. • The contractor shall devise a soil and erosion management plan. The stockpiles must be stored in a demarcated area protected from wind and rain (either through covering and/or orientation) and in a location where watercourses cannot be impacted. • Limit the height and slope of material stockpiles to reduce wind entrainment. Stockpiles exceeding 1.5-2 m in height are more likely cause dust during windy conditions. • Disturbed areas no longer used for construction purposes shall be stabilised and re-vegetated immediately. • Refer to mitigation measures in relation to watercourses (Section 6.2.3).	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Short term**	**Immediate**
Extent	**Local**	**Local**
Magnitude	**Low**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Probable**	**Unlikely**
Confidence	**Medium**	**Medium**
Reversibility	**High**	**High**

Phase	Construction	
Resource irreplaceability	Low	Low
Comment on significance	The potential for mitigation is high with the application of good construction management measures.	
Cumulative impacts	The cumulative impact of soil erosion from construction of the other identified projects is not considered to be a significant impact within the region because activities are limited to the construction phase, would be located mostly at camps and pylon locations which are located at intervals (300-500m) apart and are easy to mitigate. The overall footprint of impact within the soil resource presented in the region is considered to be of minor (-) significance.	

Table 6.21: Operational Impact: Soil erosion and loss of topsoil

Phase	Operational	
Impact description	Maintenance activities involve the clearing of vegetation within the right-of-way to ensure safe clearances, facilitation of access for maintenance and repair activities, and reduction of biomass that poses a fire hazard. Clearing the 55 m servitude is not recommended. If clearing is not managed responsibly, i.e. without cognisance of the specific environmental context, the ground could become destabilised and prone to erosion. Areas at higher risk are topographical features such as steep slopes, watercourses and overgrazed areas. In steep slopes and/or heavy rainfall areas (namely heavy rain during a short time period) the magnitude and significance of the impact will be greater than on flat/gently sloping areas and/or areas with low rainfall. The intensity of erosion is also influenced by precipitation but the area has a low average annual rainfall of less than 600 mm.	
Mitigation measures	• Refer to Section 6.3.1 for specific bush-clearing mitigation measures. • When designing the access route, the existing accesses should be considered first and as far as possible to avoid the need to construct new access roads; • When new road accesses are necessary, they are to be designed in such a way as to minimise the uncontrolled flow of runoff; • Where necessary, channelled flow should be diverted to ditches cut into the soil that follow the level contours of the land; • If gulleys appear, construction of drainage channels with stream flow dissipation along the access, should be considered; • In steep-slope areas where a high risk of erosion is expected, access roads should be surfaced with a bituminous mixture; • Indigenous vegetation that does not interfere with the transmission line should not be removed; • Any RNT operational procedures or standards related to soil erosion that are applicable, should be adhered to; • During maintenance activities, all movements must be kept within the existing roads in the servitude and no deviation is permitted; • Burning of vegetation within the servitude is not permitted; • The integrity of the banks of watercourses shall be maintained by only trimming parts of trees directly affecting the safe operation of the line. All riparian vegetation should be maintained as far as possible, in order to prevent soil loss; and • Deep valleys and environmentally-sensitive areas that restrict vehicle access, or legally protected areas, shall not be cleared of vegetation, provided that the vegetation poses no threat to the safe operation and reliability of the line. A one (1) metre "trace-line" may be cut through the vegetation for stringing purposes only and no vehicle access shall be allowed along the cleared "trace-line". Alternative methods of stringing across inaccessible valleys should be considered.	
	Without mitigation	**With mitigation**
Nature	Negative	Negative

Phase	Operational	
Duration	Permanent	Permanent
Extent	Local	Local
Magnitude	Moderate	Low
Significance	MODERATE (-)	MINOR (-)
Probability	Probable	Unlikely
Confidence	Medium	Medium
Reversibility	Medium	High
Resource irreplaceability	Low	Low
Comment on significance	The potential for effective mitigation is high if the access road is well designed and if bush clearing actions consider the receiving environment.	
Cumulative impacts	The cumulative impact of soil erosion during the operation of similar projects is not considered to be a significant impact within the region because, in general, not all vegetation is removed from the servitude and access roads are designed in a manner so as to avoid erosion. The overall impact of soil erosion in the region, is considered to be of minor (-) significance.	

6.2.4.2.2 Soil contamination

The potential impacts on soils, as a result of chemical and/or biological contamination, are described below in Table 6.22.

Table 6.22: Construction Impact: Soil contamination

Phase	Construction
Impact description	In a general sense, the definition of soil pollution is the presence of chemicals (pollutants or contaminants) in soil in high-enough concentrations to be of risk to human health and/or ecosystems. Soil pollutants include a variety of contaminants or chemicals (organic and inorganic), which could be both naturally-occurring in soil and manmade. In both cases, the main soil pollution causes are human activities (i.e. the accumulation of these chemicals in soil at levels of health risk is due to human activities such as accidental leaks and spills, dumping, manufacturing processes, etc.). The intrinsic characteristics of soils (e.g. clay minerals, carbonates, organic matter, etc.) can further enhance or naturally minimise a certain type of potential contamination. Construction sites involve the handling and management of a number of pollutants, namely hazardous materials including fuel, solid waste, wastewater, and concrete batching activities. By accident/incident or mismanagement, these substances can be incorporated into the soil, degrading it and changing its ability to be used. This also has an indirect impact on water resources (see Section 6.2.3). Whilst all these sources are assessed here, mitigation measures from other sections has been cross-referenced. Waste management is assessed in Section 6.4.4 and the contamination of groundwater in Section 6.2.3.2.1.
Mitigation measures	• No concrete batching on exposed soil shall be permitted and the batching plant must be installed on an impermeable surface; • There should be as few as possible concrete plants, provided this doesn't hamper the normal functioning of the works; • 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; • Where possible and practical, all maintenance of vehicles and equipment must take place in Lubango or in Cahama. If this is not possible then the maintenance work should be carried out in the workshop area of the construction camps; • The contractor must ensure the absorbent and/or clean-up kit/s are readily available on site to clean up any spillages. Contractors must also ensure that they have qualified personnel to undertake soil decontamination;

Phase	Construction	
	• Spillages must be cleaned up immediately; • Soil contaminated during leakage or spillage of hazardous substance shall be disposed of as hazardous waste and treated in accordance with the requirements of Angolan law; and • Washing of concrete mixers should be done near the foundation of the pylons, thus minimising the dispersion of cement on, and absorption by, the soil.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**From Short term to permanent1**	**Imediate**
Extent	**Local**	**Local**
Magnitude	**Low**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Probable**	**Highly unlikely**
Confidence	**Medium**	**Medium**
Reversibility	**Medium to high2**	**High**
Resource irreplaceability	**Low**	**Low**
Comment on significance	The potential for mitigation is high with the application of good construction management measures.	
Cumulative impacts	Soil contamination from construction of the other identified projects is not considered to be a significant impact within the region because activities are limited to the construction phase, would be located mostly at camps, which would be of great distances apart and are easy to mitigate. The overall footprint of impact within the soil resource presented in the region, is considered to be of minor (-) significance.	

6.2.4.2.3 Land use changes

6.2.4.2.3.1 Methodology

As mentioned in Section 2.4.4, within the line servitude (55 m total width), a 20 m strip will be completely cleared of trees and obstacles and, for the construction of each tower, an area of approximately 20 m x 20 m will be cleared. Additionally, in areas near the corridor where there are no roads, dedicated access routes to the infrastructure must be created, which will be used during maintenance operations in the operational phase.

To assess the environmental impacts of land use changes due to project implementation, a 60 m wide corridor from the centre of the powerline (30 m to each side) was considered. This corridor encompasses the entire servitude, with a small extra margin of 5 m included. It is therefore the worst-case scenario for the impact on current land use.

The identified land use units potentially affected by the project, are presented in Table 6.23.

Table 6.23: Land cover units per community, within the 60 m corridor

Municipality	Community	Land cover unit	Total (ha)
Lubango	Hoque	120 - Mosaic Grassland/Forest - Shrubland	1.88
		140 - Close to open Grassland	56.23
		30 - Mosaic Vegetation/Croplands	52.11
	Hoque Total		**110.21**

1 Depending on the characteristics of the contaminant.
2 Depending on the: volume of contaminant released, soil permeability at the spill site and response time to the event.

Municipality	Community	Land cover unit	Total (ha)
Lubango Total			**110.21**
Chibia	Kapunda Kavilongo	110 - Mosaic Forest - Shrubland/Grassland	12.00
		120 - Mosaic Grassland/Forest - Shrubland	3.09
		140 - Close to open Grassland	115.99
		30 - Mosaic Vegetation/Croplands	88.44
		60 - Open Broadleaved Deciduous Forest	8.24
	Kapunda Kavilongo Total		**227.76**
	Kihita	110 - Mosaic Forest - Shrubland/Grassland	5.25
		120 - Mosaic Grassland/Forest - Shrubland	22.93
		130 - Closed to open Shrubland	23.04
		140 - Close to open Grassland	35.79
		30 - Mosaic Vegetation/Croplands	34.95
		50 - Closed Broadleaved Deciduous Forest	15.53
		60 - Open Broadleaved Deciduous Forest	15.35
	Kihita Total		**152.83**
Chibia Total			**380.60**
Gambos (ex-Chiange)	Chimbemba	130 - Closed to open Shrubland	121.15
		140 - Close to open Grassland	1.18
		30 - Mosaic Vegetation/Croplands	15.09
		50 - Closed Broadleaved Deciduous Forest	109.48
		60 - Open Broadleaved Deciduous Forest	297.91
	Chimbemba Total		**544.81**
Gambos (ex-Chiange) Total			**544.81**
Cahama	Kahama	110 - Mosaic Forest - Shrubland/Grassland	0.08
		130 - Closed to open Shrubland	26.23
		140 - Close to open Grassland	192.65
		30 - Mosaic Vegetation/Croplands	53.60
		50 - Closed Broadleaved Deciduous Forest	5.05
		60 - Open Broadleaved Deciduous Forest	43.56
	Kahama Total		**321.17**
	Otchinjau	110 - Mosaic Forest - Shrubland/Grassland	3.45
		120 - Mosaic Grassland/Forest - Shrubland	0.59
		130 - Closed to open Shrubland	30.69
		140 - Close to open Grassland	89.59
		30 - Mosaic Vegetation/Croplands	22.14
		60 - Open Broadleaved Deciduous Forest	24.57
	Otchinjau Total		**171.03**
Cahama Total			**492.20**
Curoca	Chitado	110 - Mosaic Forest - Shrubland/Grassland	13.97
		130 - Closed to open Shrubland	5.22
		140 - Close to open Grassland	123.56
		30 - Mosaic Vegetation/Croplands	52.46
		60 - Open Broadleaved Deciduous Forest	5.40
	Chitado Total		**200.61**
Curoca Total			**200.61**
Ombadja	Humbe	110 - Mosaic Forest - Shrubland/Grassland	3.66
		120 - Mosaic Grassland/Forest - Shrubland	1.88
		130 - Closed to open Shrubland	35.37
		140 - Close to open Grassland	94.40
		30 - Mosaic Vegetation/Croplands	88.20
		60 - Open Broadleaved Deciduous Forest	9.40

Municipality	Community	Land cover unit	Total (ha)
	Humbe Total		**232.92**
	Naulila	140 - Close to open Grassland	20.98
	Naulila Total		**20.98**
Ombadja Total			**253.90**
Grand Total (ha)			**1 982.33**

Following the same tendency of land cover within the DAI, the most representative land cover units are the Closed to Open Grassland (140), that occupies 37% of the 60 m corridor, followed by the Mosaic Vegetation/Croplands (30), representing 21%, the Open Broadleaved Deciduous Forest (60) with 20%, and finally the Closed to Open Shrubland (130) with 12%. The remainder of the land cover units within the 60 m corridor represent 11% of the total and, as such, have very little representation in the area.

As stated in Section 5.3.2.5, the study area does not include any critical habitat that is exclusively found in the affected region and, as such, the potentially-affected land cover units do not have high conservation values that need to be taken into account.

6.2.4.2.3.2 Impacts associated with changes to land use

The potential impacts associated with the changes to current land use, due to the disturbance or loss of land uses/habitats during construction, are described below.

Table 6.24: Construction Impact: Changes to land use

Phase	Construction	
Impact description	Construction will result in the loss or disturbance of the existing land uses by clearing vegetation (primarily clearing of trees within the 12 m servitude area). The potentially-affected land uses are quite common within the region and no critical habitat is expected to be impacted by the project (refer to Section 6.3.1).	
Mitigation measures	• Apply mitigation measures proposed in section 6.3 (biotic environment) to limit vegetation clearance to the strictly required areas (to include in the demining plan); • Avoid sensitive habitats (informed by walk-down) when locating construction sites (refer to Section 6.3.1); • Locate the construction camps in disturbed areas, rather than disturbing new areas, and as remote as possible from watercourses and sensitive habitats; • Priority should be given to existing accesses, and to areas already affected/disturbed, when selecting the final location of the pylons; • Only the larger tree species and/or individuals potentially causing problems with the transmission line servitude, should be removed; • Implement erosion control, especially in sensitive areas such as river banks and steep slopes; • Any forested area identified for clearing will be verified during the detailed project design, which is committed to prevent or minimise economic damage to the local communities. Refer to Sections 6.4 to ensure that economic displacement, due to the loss of livelihoods and natural resources, are kept to a minimum; and • Provide a Grievance Redress Mechanism for the handling of complaints/ requests and for gathering information for consideration as to a possible need for implementation of new measures.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Long term**	**Short term**
Extent	**Local**	**Very limited**
Magnitude	**Moderate**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Almost certain / Highly probable**	**Likely**

Phase	Construction	
Confidence	**Medium**	**Medium**
Reversibility	**High**	**High**
Resource irreplaceability	**Medium**	**Low**
Comment on significance	The contractor's commitment to the application of recommended measures reduces impacts, but monitoring is required to ensure that such measures are implemented. The influx of people along the corridor has an indirect impact and could exacerbate the disturbance of current land uses.	
Cumulative impacts	Further developments such as transmission lines, Baynes Dam, large farms with irrigation activities, and exploration and mining activities, could contribute to a minor (-) cumulative impact being realised, as increased development can result in increased land use and associated habitat destruction.	

The potential impacts as a result of the disturbance or loss of flora during operation, are described below.

Table 6.25: Operational Impact: Changes to land use

Phase	Operation	
Impact description	Land use disturbance or loss would be localised along the corridor and is closely linked to habitat loss/disturbance and therefore to the impacts discussed in Section 6.3.1. The 12 m strip of clearance that will be established during construction will be maintained during operation through bush clearing. The future climate change scenario could potentially result in increased erosion along the steeper access route(s) and cleared areas beneath the transmission line, especially if the intensity of rainfall events increases.	
Mitigation measures	• Road rules (stay with speed limits, avoid off-road and night driving) must be adhered to at all times; and • Monitoring and rehabilitation of all disturbed sites must be undertaken, particularly for steep slopes and watercourse crossings.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Long term**	**Short term**
Extent	**Local**	**Very limited**
Magnitude	**Moderate**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Almost certain / Highly probable**	**Likely**
Confidence	**Medium**	**Medium**
Reversibility	**High**	**High**
Resource irreplaceability	**Medium**	**Low**
Comment on significance	The influx of people along the route, as an indirect impact of the presence of the line, could exacerbate the disturbance to current land uses.	
Cumulative impacts	Further developments such as transmission lines, Baynes Dam, large farms with irrigation activities, and exploration and mining activities, can contribute to a negligible (-) cumulative impact.	

6.2.4.3 No-Go alternative

The No–Go alternative will allow the status quo to prevail and the impact can be considered neutral, as the magnitude would be considered zero, meaning natural and/or social functions and/or processes remain unaltered. With the exception of some small areas that have been disturbed, the ground and soils within the IAI are mostly undisturbed and uncontaminated due to the rural and isolated nature of most of the corridor, and will remain this way, unless other anthropogenic influences arrive in the area.

6.2.4.4 Summary

Most of the impacts on soil resources is expected during the construction phase as a result of earthworks and poor construction practices such as topsoil management and handling of toxic chemicals. This has the potential to cause soil erosion and soil contamination. During operation, the vegetation management activities within the servitude may also result in soil erosion if they are not correctly planned and cognisance of the receiving environment is not taken into consideration. Mitigation measures can effectively reduce the significance of such impacts. During construction and operation such impacts will be of negligible negative significance with mitigation.

The project will result in clearance of vegetation and other disruptive activities during construction, to install the infrastructure including the pylons and access roads. These construction impacts are rated as being of negligible significance with mitigation, with the greatest risk (if unmitigated) being to unique flora/fauna species in sensitive habitats, such as the Cunene and Caculuvar Rivers, ephemeral drainage lines and fountains and associated riparian vegetation, rocky ridges/inselbergs, etc. (refer to Section 5.3.2.5). Mitigation is primarily the avoidance of these sensitive areas, which can be identified though a pre-construction walk-down to inform the detailed design.

During operation, the maintenance of the transmission line will result in the felling of large trees, with resultant impacts to habitat and land uses. Again, the greatest risk would be to sensitive habitats if unmitigated. Mitigation includes avoidance of sensitive areas (as identified during construction) and avoidance of certain tree species during maintenance.

6.2.5 Air Quality

6.2.5.1 Overview

This section aims to assess the impact on air quality during construction. The inefficient combustion of fossil fuel by industry and the transport sector releases a variety of pollutants into the atmosphere, which can have detrimental impacts on human, animal and plant health. The most common pollutants associated with vehicle emissions are carbon monoxide (CO) and nitrogen oxides (NOx). Particulate matter, including coarse particles (PM 2.5–10[1]), is emitted mainly from tailpipe exhaust fumes and by the wear of tyres and brakes of vehicles. The project has the potential to contribute to such emissions through construction traffic and other construction activities. No independent assessment study was done to assess the impacts on air quality.

6.2.5.2 Potential impacts and mitigation

The potential impacts on air quality during construction are described below.

Table 6.26: Construction Impact: Air quality impact

Phase	Construction
Impact description	Construction phase activities will generate Particulate Matter (PM) as dust, during land clearing activities such as bulldozing and scraping of vegetation and topsoil at pylon foundations and camps, earthworks for the pylon foundations, material handling (such as transport, stockpiling and loading and offloading of soil and spoil) and vehicle entrainment. Gaseous emissions from the idling of vehicles and equipment will also occur. 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. It is expected that pylon locations, where most of the earthworks will take place, are 300 to 500 m apart and will be excavated sequentially. There are few receptors within proximity to the corridor, or near the proposed camp location (near the Kunene substation site).

1 Aerodynamic diameter of particle between 2.5 and 10 μm

Phase	Construction	
	Although modelling for the construction phase has not been undertaken, the current ambient air quality levels are expected to fall well within the World Health Organisation (WHO) standards and guidelines, and it can therefore be concluded that it is unlikely that the current levels will be exceeded in the light of the low existing levels of air pollution. The impacts of climate change have been assessed separately in Section 6.2.1. Note that mitigation measures for dust generation from topsoil management are provided in Section 6.2.4.2.1.	
Mitigation measures	Dust: • Dust suppression measures are to be applied during construction. Measures such as water or non-toxic chemical dust suppression can be used. If water is used it must be reused / recycled water (i.e. from settlement ponds). Any chemicals utilised must be of a biodegradable nature and approved by the ECO; • The site activities are to be planned so that machinery and dust-generating activities are located away from sensitive receptors (i.e. homesteads or villages), as far as possible; • Establishment and enforcement of vehicle speed limits on haul roads and construction camps are required, to reduce the generation of dust; • All access roads must be adequately compacted and periodically graded and maintained; • Limit earthworks during windy conditions (i.e. winds above 40 km/h); • Limit vehicle travelling speeds on unsurfaced roads to 40 km/h; • No overloading of fine material may be permitted and, where necessary, the truck loads transporting fine material must be covered with a tarpaulin to prevent dust dispersal; and • Any dust complaints received from the community will be recorded in a complaints register, and promptly investigated and addressed. A Grievance Mechanism will also be available to any grievances in this regard. Vehicle emissions: • Select 'low-emission' construction vehicles and machinery wherever possible; • Where possible, low-sulphur diesel is to be used; • All vehicles and equipment must be well-maintained and serviced according to manufacturer's specifications; • Ensure all new plant/equipment being delivered to site has undergone inspection to ensure good working conditions and compliance with low emissions requirements; • Enforce strict compliance with speed limits for all construction vehicles; • Minimise idling times by enforcing vehicles and equipment to power off when not in use, and/or reducing the maximum idling time to five minutes for all equipment; • Appropriate Personal Protective Equipment (PPE) must be worn at all times when working in areas exposed to hazardous emissions; and • The indiscriminate burning of materials resulting from clearance of trees, bushes, combustible materials and waste is prohibited.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Brief**	**Permanent**
Extent	**Very limited**	**Limited**
Magnitude	**Low**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Almost certain / highly probably**	**Almost certain / highly probably**
Confidence	**Medium**	**Medium**
Reversibility	**High**	**Medium**
Resource irreplaceability	**Low**	**Medium**

Phase	Construction
Comment on significance	Impacts associated with air emissions are considered to be limited due to them being confined to specific areas (small segments of corridor length) during the construction phase.
Cumulative impacts	In the surrounding area of Lubango, the presence of industrial plants, the airport and the heavy traffic can contribute to peaks of air pollution, especially in adverse weather conditions (low wind, high heat, atmospheric inversion, etc.). The main roads in the study area (EN295, EN105 and EN10) can also be a source of air emissions but, considering the level of traffic they carry, which consists of heavy and non-heavy vehicles, these emissions are punctual and confined. The existing mining activities in the area between Lubango and Cahama, that also generate dust and air emissions, are the other activities in the study area that may contribute to air pollution. However, it is considered that there is limited potential for cumulative impacts associated with dust or vehicle exhaust emissions from the construction activities, as these impacts are temporary in nature and restricted to the immediate area of the construction activities and vehicle circulation to and from construction camps on unpaved roads. Therefore, these impacts are considered to be of negligible (-) significance.

6.2.5.3 No-Go alternative

The No-Go alternative will allow the status quo to prevail and the impact can be considered neutral, as magnitude would be considered zero, meaning natural and/or social functions and/or processes remain unaltered.

6.2.5.4 Summary

The impact of air quality from dust and vehicle emissions is considered to be of negligible significance due to the temporary nature of construction activities, the limited number of sensitive receptors, and air quality that is assumed fairly favourable due to the remote nature of the corridor. The impact is rated as having an impact of negligible negative significance and can be mitigated through the application of various good practice measures involving performance and equipment care.

6.2.6 Ambient noise

6.2.6.1 Overview

This section assesses the noise impacts of the development and the associated potential nuisance to nearby sensitive receptors. Construction activities along the corridor, and at the construction camps, can result in loud noise emissions from the equipment and vehicles used during the works. No independent assessment study was undertaken to assess the impact on ambient noise.

6.2.6.2 Potential impacts and mitigation

The potential impacts of noise emissions during construction, are described below.

Table 6.27: Construction Impact: Noise emissions

Phase	Construction
Impact description	Low ambient noise levels are expected due to the rural location of the overall corridor. Any increase in ambient noise levels for extended periods of time would therefore be noticeable to any noise-sensitive receptors. However, these are limited along the corridor, as the construction at each pylon location will take around 2 weeks, including the time for the concrete to cure. Noise will be generated by the operation of heavy machinery, and by construction vehicles at, or between, the base construction camp and any active sites along the corridor. Noise will vary substantially from day to day, depending on the level of activity, the specific operations, and the topographical and atmospheric conditions. Noise may also be augmented by a number of activities occurring simultaneously.

Phase	Construction	
	An increase in the ambient noise levels could be experienced as disturbance by adjacent communities (homesteads or villages). Standard noise suppression measures can be implemented to reduce any potential nuisances, should it be necessary.	
Mitigation measures	• Construction may only occur during the daytime; • Should construction have to continue after hours, all communities affected must be notified; • Site inductions should cover the importance of noise control and of the available noise reduction measures; • All machinery and equipment must be maintained in good working order and must meet current good practice noise emission levels. This should be achieved by making it a component of contractual agreements with the construction contractors; • Prior to any identified particularly noisy processes, the nearest affected communities must be informed of the proposed timing of the specific works in their area; • Noise complaints received from the community will be recorded in a complaints register, and promptly investigated and addressed. A Community Liaison Officer will be appointed, representing a critical element in the management of the impacts; • A Grievance Mechanism will also be available to any grievances in this regard; • Preventative measures shall be undertaken, where practical, to minimise complaints regarding noise and vibration nuisance; • Where reasonable and feasible, good practice noise mitigation measures should be applied including: - All equipment shall be turned off when not in use; - Maximising the offset distance between noisy equipment items and sensitive receptors; - Avoiding the coincidence of noisy equipment working simultaneously and in close proximity, when adjacent to sensitive receptors; - Minimising consecutive works in the same locality; - Orienting equipment away from noise-sensitive receptors; and - Carrying out loading and unloading away from noise sensitive areas. • Ensure good driving practices, as follows: - Minimise the reversing of equipment to prevent nuisance caused by reverse alarms; - Reduce unnecessary acceleration and braking squeal when approaching and leaving the site; - Ensure compliance with speed limits for all construction vehicles; and - Limit noise-producing signals, including horns, whistles, alarms, and bells to safety warning purposes only.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Brief**	**Permanent**
Extent	**Very limited**	**Limited**
Magnitude	**Low**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Almost certain / highly probably**	**Almost certain / highly probably**
Confidence	**Medium**	**Medium**
Reversibility	**High**	**Medium**
Resource irreplaceability	**Low**	**Medium**
Comment on significance	Potential impacts due to the increase of ambient noise are considered to be limited due to the context, but temporary nuisance is possible.	

Phase	Construction
Cumulative impacts	In the surrounding area of Lubango, the presence of industrial plants, the airport and heavy traffic may contribute to peaks in noise emissions. The main roads in the study area (EN295, EN105 and EN10) can also be a source of noise emissions but, considering the level of traffic they carry, which consists of heavy and non-heavy vehicles, these emissions are punctual and very confined. The existing mining activities in the area between Lubango and Cahama, that also contribute to the noise nuisance, are the other activities in the study area that may contribute to air pollution. However, it is considered that there is limited potential for cumulative impacts associated with noise emissions from the construction activities, as these impacts are temporary in nature and restricted to the immediate area of the construction activities. Therefore, these impacts are considered to be of negligible (-) significance.

6.2.6.3 No-Go alternative

The No-Go alternative will allow the status quo to prevail and the impact can be considered neutral, as magnitude would be considered zero, meaning natural and/or social functions and/or processes remain unaltered.

6.2.6.4 Summary

The impact of noise is considered to be of negligible significance due to the temporary nature of activities, the limited number of sensitive receptors and the generally low ambient noise levels due to the remote nature of the corridor. The impact is rated as being of negligible negative significance and can be mitigated through the application of various good practice measures involving performance and equipment care.

6.3 Biotic Environment

6.3.1 Terrestrial Ecology

6.3.1.1 Overview

The impacts on terrestrial ecology (flora, vertebrate fauna and local ecosystem services) have been assessed separately from avifauna (Section 6.3.2). The general region that the study area traverses comprises broadly of the following ecoregions: Angolan Miombo Woodland, Zambezian Baikiaea Woodland and Angola Mopane Woodland. The majority of the corridor runs in the Angolan mopane woodlands ecoregion. While these ecoregions may support sensitive species, they are not exclusively represented in the study area. The ANNA corridor passes very close to the Western extent of the Bicuari National Park, however the area between the park and the proposed corridor is densely occupied and that there are several existing road tracks through this area. These land uses therefore provide a buffer for any project induced impacts on the park's terrestrial ecology.

Vegetation loss in the study area is inevitable as a result of the new development footprint, including pylons, new access roads along sections of the route, temporary installation of construction camps, and clearing of trees within the servitude beneath the lines. This will result in the loss of flora and of habitat for fauna. Disruptive activities may also impact flora and fauna. Ecosystem services may also be affected, along with the communities that are directly reliant on the environmental resources for their subsistence.

6.3.1.2 Disturbance or loss of flora

Construction will result in the loss or disturbance of flora through the clearing of vegetation in the servitude area, construction camps, access roads and Cahama substation, and may cause disturbance to vegetation outside the work areas through negligent behaviour of contractors, such as driving off road, collection of plants and firewood, lighting fires, etc. However, it is important to emphasise that the study area does not include any critical habitat that is exclusively found in the affected region.

The impacts associated with the construction of the pylon infrastructure are not expected to be detrimental to flora, i.e. areas to be affected are small and localised/confined, or to negatively impact the habitat of potentially-unique flora, particularly if the proposed mitigation measures are applied.

The footprint of the access routes is larger than for the actual pylon footprints, but still limited, and not expected to impact potentially-unique flora or critical habitat negatively if the proposed mitigation measures are implemented.

The impact from the development of the Cahama substation is not expected to be detrimental to flora, as the areas to be affected are not pristine, but rather degraded farmland areas. The development footprint of the substation site is relatively small (~6 ha) and not expected to impact potentially-unique flora or critical habitat negatively if the proposed mitigation measures are followed.

The potential impacts related to the disturbance or loss of flora during construction, are described below.

Table 6.28: Construction Impact: Disturbance or loss of flora

Phase	Construction
Impact description	The natural land cover in the servitude will incur changes as a result of clearance for the new infrastructure, namely at the pylon locations, new access roads (albeit limited), and the area beneath the line. However, the primary impacts on flora during construction will occur namely as the loss or disturbance of flora through the clearing of vegetation (mostly the clearing of trees within the 55 m servitude area). The study area does not include any critical habitat that is exclusively found in the affected region.
Mitigation measures	• The project final design must ensure that all infrastructure within the vicinity of the Bicuari National Park are kept at a minimum distance of 500 m of this protected area and existing tracks are to be used. If there is any need to deviate from the proposed alignment, this change can only occur west of the current centreline which is further away from the Park (refer to Figure 5.51). • During construction, no activities are to interference with the Bicuari National Park. This includes the location of any camps, accommodation or roads, which must be located as far as possible from the park.. • Avoid sensitive habitats (informed by walk-down) when locating construction sites (e.g. Cunene and Caculuvar Rivers, ephemeral drainage lines and fountains, and associated riparian vegetation, rocky ridges/inselbergs (broken terrain), etc. – refer to Section 5.3.2.5); • Locate the construction camps in disturbed areas, instead of disturbing new areas, and as far away as possible from watercourses and sensitive habitats; • Only the larger tree species, and/or individuals potentially causing problems with the transmission line servitude, should be removed – i.e. it is not necessary to completely clear the access route beneath the line or the servitude as a whole; • Chemicals should be used judiciously if/when used for access route maintenance. Specifically, herbicides should be avoided where possible, and only used as a last resort and with caution where absolutely necessary. Refer to the Herbicide Management Plan in the ESMP (Vol. III); • Damage to all Aloe species, *Adenia pechuelii, Adenium boehmianum*, etc., is to be avoided but, if unavoidable, affected specimens of these plants must be relocated to a similar habitat along the route. No collection of these species for resale should be allowed; • Implement erosion control, especially in sensitive habitats and on steep slopes; • Prevent and discourage the making of fires, as this could easily cause runaway veldfires, causing problems (such as loss of grazing and domestic stock mortalities, etc.) for the neighbouring communities; • Prevent and discourage the collecting of firewood, as dead wood has an important ecological role. Such collecting of firewood, especially for economic reasons, often leads to abuse, such as the felling of live and/or protected tree species, such as *Acacia erioloba,* which have good quality wood; • Prevent the planting of potentially alien invasive plant species (e.g. *Tecoma stans, Pennisetum setaceum*, etc.) for ornamental purposes as part of the landscaping (e.g. around construction office sites, substation site, etc.). Alien species often escape and become invasive, causing further ecological damage;

Phase	Construction	
	• Implement a policy of "no tolerance" towards any invasive alien plant species encountered in the area (e.g. *Opuntia* spp., etc.). This should include the removal and destruction of these species throughout the proposed development areas. Such activity would be beneficial to the overall ecology of the areas. Refer to the Alien Invasive Species Management Plan in the ESMP (Vol. III); • Cleared trees should be made available to local communities for firewood or construction material, to reduce their reliance on further clearance of natural areas; and • Various rehabilitation measures are recommended for the most seriously-affected areas, i.e. temporary access route(s), construction sites, offices, etc.), such as removal/relocation of protected species, replanting/reseeding, etc.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Long term**	**Short term**
Extent	**Local**	**Very limited**
Magnitude	**Moderate**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Almost certain / Highly probable**	**Likely**
Confidence	**Medium**	**Medium**
Reversibility	**High**	**High**
Resource irreplaceability	**Medium**	**Low**
Comment on significance	The contractor's commitment to applying recommended measures reduces impacts, but this requires monitoring to ensure that such measures are implemented. The influx of people along the route as an indirect impact of the presence of the line could exacerbate the disturbance to flora. However, the existing access route will be used as far as possible so as not to create additional access routes.	
Cumulative impacts	Further developments, such as transmission lines, Baynes Dam, large farms with irrigation activities, and exploration and mining activities, may contribute to a minor (-) cumulative impact, as increased developments can result in increased habitat and flora destruction.	

The potential impacts related to the disturbance or loss of flora during operation, are described below.

Table 6.29: Operational Impact: Disturbance or loss of flora

Phase	Operational
Impact description	Floral disturbance or loss would be localised along the route. Floral loss/disturbance is closely linked to habitat loss/disturbance and therefore to the impacts discussed in Section 6.3.1.3. The 12 m strip of clearance that will be established during construction, will be maintained during operation by manual bush clearing (and/or by the application of herbicides as a last resort only) to prevent the coppicing sprouting of shrubs/trees that have been cut. The future climate change scenario could potentially result in increased erosion along the steeper access route(s) and cleared areas beneath the transmission line, especially if the intensity of rainfall events increases.
Mitigation measures	• Chemicals should be used judiciously if/when used for maintenance. Refer to the Herbicide Management Plan in the ESMP (Vol. III);. Specifically, herbicides should be avoided where possible and only used as a last resort and with caution where absolutely necessary. • Road rules (staying within speed limits, avoiding off-road and night driving) must be adhered to at all times; • Monitoring and rehabilitation of all disturbed sites, particularly steep slopes and watercourse crossings, must be undertaken; and

Phase	Operational	
	• All invasive alien plants encountered along the route must be eradicated. Refer to the Alien Invasive Species Management Plan in the ESMP (Vol. III).	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Long term**	**Short term**
Extent	**Local**	**Very limited**
Magnitude	**Moderate**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Almost certain / Highly probable**	**Likely**
Confidence	**Medium**	**Medium**
Reversibility	**High**	**High**
Resource irreplaceability	**Medium**	**Low**
Comment on significance	The influx of people along the route as an indirect impact of the presence of the line, could exacerbate the disturbance of flora.	
Cumulative impacts	Further developments, such as transmission lines, Baynes Dam, large farms with irrigation activities, and exploration and mining activities, may contribute to a negligible (-) cumulative impact, as this would occur at very specific locations and have small footprints.	

6.3.1.3 Disturbance or loss of fauna

The potential impacts related to the loss or disturbance to fauna during construction, is described below (avifauna is addressed in Section 6.3.2.

Table 6.30: Construction Impact: Disturbance or loss of fauna

Phase	Construction
Impact description	Construction work has the potential to result in the loss or disturbance of fauna through either the loss of habitat supporting fauna, or the actions of workers such as the illegal collection of animals for food or trade (e.g. tortoises, giant bullfrogs) or killing of perceived dangerous species such as snakes and predators.
Mitigation measures	• The project final design must ensure that all infrastructure within the vicinity of the Bicuari National Park are kept at a minimum distance of 500 m of this protected area and existing tracks are to be used. If there is any need to deviate from the proposed alignment, this change can only occur west of the current centreline which is further away from the Park (refer to Figure 5.51). • During construction, no activities are to interference with the Bicuari National Park. This includes the location of any camps, accommodation or roads. • Avoid disturbing important habitats (e.g. Cunene and Caculuvar Rivers, ephemeral drainage lines and fountains, and associated riparian vegetation, rocky ridges/inselbergs, etc. – refer to Section 5.3.2.5). This can be informed by the walk-down; • A representative from the local community should accompany the specialist on the walkdown to assist with identification of flora of importance. • Prevent the illegal collection of fauna for food and trade (e.g. chameleons, tortoises, giant bullfrogs), all poaching activities and killing of perceived dangerous species (e.g. all snakes and mammalian predators/carnivores); • Prevent the unnecessary destruction of habitat trees, e.g. dead trees and old specimens. Cavity and bark dwelling faunal species utilise these trees, namely various geckos, snakes, bats, genets and galagos, etc.); • As far as possible, make use of existing tracks/roads throughout the area; • Implement and maintain road rules with maximum speed limits (e.g. 30 km/h), as this would result in fewer animal road mortalities as well as less associated dust

Phase	Construction	
	emissions. Temporary speed humps could also be used to limit the speed at which people travel; • 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; • Rehabilitate all new tracks created; • Rehabilitate erosion related to construction activities in, and adjacent to, water sources if/where required, to prevent siltation that may affect amphibian breeding; • Prevent (do not allow) domestic pets such as cats and dogs to accompany workers on site, as domestic animals can cause considerable damage to the local reptile and mammal fauna. Cats also interbreed and transmit diseases to the indigenous African wildcat found in the area. The indiscriminate and wanton killing of local fauna by such pets should be avoided at all cost; • Initiate a policy of capture and removal of fauna (e.g. slow-moving species such as tortoises and chameleon, etc.) encountered serendipitously within the construction areas. Such fauna should be removed to other areas of similar habitat in the area. • Educate/inform contractors about dangerous and protected species to avoid unnecessary harm/killing of these species, as well as about the consequences of illegal collection of such species; • Use portable toilets to avoid faecal pollution of water sources; and • Initiate a suitable and appropriate refuse removal policy, as littering could result in certain animals becoming accustomed to humans, and their associated activity, and may result in typical problem animal scenarios as is evident elsewhere with species such as baboon, black-backed jackal, etc.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Brief**	**Brief**
Extent	**Limited**	**Limited**
Magnitude	**Moderate**	**Very low**
Significance	**NEGLIGIBLE (-)**	**NEGLIGIBLE (-)**
Probability	**Probable**	**Probable**
Confidence	**Medium**	**Medium**
Reversibility	**High**	**High**
Resource irreplaceability	**Low**	**Low**
Comment on significance	The contractor's commitment to the implementation of measures reduces impacts, but this requires monitoring to ensure that such measures are in fact implemented.	
Cumulative impacts	Further developments such as transmission lines, Baynes Dam developments, and exploration and mining activities, will contribute to a negligible (-) cumulative impact, as increased developments are expected to result in increased habitat and faunal destruction.	

Potential impacts related to the loss or disturbance of fauna during operation (avifauna is addressed in section 6.3.2), is described below.

Table 6.31: Operational Impact: Disturbance or loss of fauna

Phase	Operational
Impact description	The presence of aboveground pylon and access road infrastructure, is not expected to be detrimental to reptiles, amphibians or mammals, or their habitats, i.e. would not impede their movement, especially if the proposed mitigation measures are followed. The footprint of access routes is larger than for the pylon footprints, but still limited, as these roads will be used infrequently and are not expected to impact potentially unique reptilian, amphibian or mammalian habitats negatively, particularly if the recommended mitigation measures are applied. However, should wetland areas be

Phase	Operational	
	drained for access roads and/or built up (raised) in these areas, then the flow of water could be altered, and amphibian habitat potentially affected. The transmission line would need to exceed 6.7 m in height (minimum clearance recommended for giraffe) so as to allow elephant and giraffe to pass through, as they may traverse the area occasionally. Giraffe are often electrocuted by reticulation networks where ground clearance is <5.2 m in height (Van Rooyen, 2003). None of the unique/important species are exclusively associated with the project area and are not expected to be adversely affected by the proposed infrastructure.	
Mitigation measures	• Avoid sensitive habitats (e.g. wetlands) if creating new access roads; • Prevent the illegal collection, for food and trade, of species such as chameleons and tortoises), all poaching activities and the killing of perceived dangerous species such as snakes and mammalian predators/ carnivores. • Make use of existing tracks/roads, and implement and enforce road rules. Avoid off-road and unnecessary night-time driving in the area, as this often results in the destruction of slow-moving reptiles and mammals, especially nocturnal species; • Monitor reptile mortalities bi-annually (e.g. monitor lizards, snakes, etc.); • Monitor erosion related to operational activities in, and adjacent to, water sources if/where required, as this could result in siltation and affect amphibian breeding, etc. Where necessary, implement erosion control, and rehabilitate; • Place a skirting of loose rocks (diameter of 2 - 3 m) around pylon bases to prevent elephants from using the pylons as rubbing posts and causing potential damage and/or being electrocuted; and • Monitor mammalian mortalities. Species such as giraffe, elephant and baboon could be affected, depending on the terrain.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Brief**	**Immediate**
Extent	**Limited**	**Limited**
Magnitude	**Low**	**Very low**
Significance	**NEGLIGIBLE (-)**	**NEGLIGIBLE (-)**
Probability	**Likely**	**Likely**
Confidence	**Medium**	**Medium**
Reversibility	**High**	**High**
Resource irreplaceability	**Low**	**Low**
Comment on significance	The influx of people along the route, as an indirect impact, could exacerbate the disturbance of fauna. However, the existing access route will be used as far as possible so as not to create additional access opportunities.	
Cumulative impacts	Further developments such as transmission lines, Baynes Dam developments, and exploration and mining activities, may contribute to a negligible (-) cumulative impact, as increased developments could result in increased habitat and faunal destruction.	

6.3.1.4 Impact on sensitive habitats

The potential impacts on sensitive habitats during construction is described below.

Table 6.32: Construction Impact: Sensitive habitats

Phase	Construction
Impact description	Construction work has the potential to result in negative impacts on unique floral and/or faunal species in sensitive habitats (e.g. Cunene River, which is an international resource and high sensitivity bird corridor, Caculuvar River, ephemeral drainage lines and pools/fountains, and associated riparian vegetation, rocky ridges/inselbergs, etc. – refer to Section 5.3.2.5). The same construction activities as discussed in Sections 6.3.1.2 and 6.3.1.3, apply.

Phase	Construction	
Mitigation measures	• The same mitigation measures as provided in Sections 6.3.1.2 and 6.3.1.3, apply.	
	Without mitigation	**With mitigation**
Nature	Negative	Negative
Duration	Permanent	Immediate
Extent	International	Limited
Magnitude	Extremely high	Very low
Significance	MAJOR (-)	NEGLIGIBLE (-)
Probability	Almost certain / Highly probable	Likely
Confidence	Medium	Medium
Reversibility	Medium	High
Resource irreplaceability	Medium	Medium
Comment on significance	The contractor's commitment to applying the recommended mitigation measures, reduces the impact, but this requires monitoring to ensure such measures are actually implemented. The influx of people along the route, as an indirect impact of the presence of the line, may exacerbate the loss of unique floral/faunal habitats. However, the existing access route will be used as far as possible, so as not to create additional access opportunities.	
Cumulative impacts	Further developments such as transmission lines, Baynes Dam, large farms with irrigation activities, and exploration and mining activities, may contribute to a minor (-) cumulative impact, as increased developments could result in increased habitat destruction	

The potential impacts on sensitive habitats during operation, is described below.

Table 6.33: Operational Impact: Sensitive habitats

Phase	Operational	
Impact description	Operational activities have the potential to result in negative impacts on unique floral and/or faunal species in sensitive habitats (e.g. River, which is an international resource and high sensitivity bird corridor, Caculuvar River, ephemeral drainage lines and pools/fountains, and associated riparian vegetation, rocky ridges/inselbergs, etc. – refer to Section 5.3.2.5). The same activities as discussed in Sections 6.3.1.2 and 6.3.1.3, apply.	
Mitigation measures	The same mitigation measures as provided in Sections 6.3.1.2 and 6.3.1.3, apply, as well as: • Refer to Grievance Mechanism in the ESMP (Vol. III) as a mechanism for the reporting of outsiders (i.e. non-local community members) using natural resources.	
	Without mitigation	**With mitigation**
Nature	Negative	Negative
Duration	Permanent	Immediate
Extent	International	Limited
Magnitude	High	Very low
Significance	MODERATE (-)	NEGLIGIBLE (-)
Probability	Almost certain / Highly probable	Likely
Confidence	Medium	Medium
Reversibility	Medium	High
Resource irreplaceability	Medium	Low

Phase	Operational
Comment on significance	The influx of people along the route, as an indirect impact of the presence of the line, may exacerbate the loss of unique floral/faunal habitats. However, the existing access route will be used as far as possible, so as not to create additional access opportunities.
Cumulative impacts	Further developments such as transmission lines, Baynes Dam, large farms with irrigation activities, and exploration and mining activities, may contribute to a moderate (-) cumulative impact, as increased developments could result in increased habitat destruction.

6.3.2 Avifauna

6.3.2.1 Overview

The study area includes a number of habitats that are considered to be sensitive in terms of avifauna. This has implications during construction, as habitat disruption and loss could impact avifauna and, more significantly, during operation, where the presence of the transmission line could result in collisions and electrocution of birds.

Although very little is known regarding bird flight paths in Angola, especially species moving/migrating at night, most birds seem to follow the shortest routes between selected habitats, such as dams, estuaries, bays, etc. However, unpredictable rainfall events may lure species into areas not normally frequented and storms may also force birds into areas not regularly visited. Planning for all eventualities is therefore not always possible. Within this ESIA, the sensitive areas identified are presented in Figure 6.5.

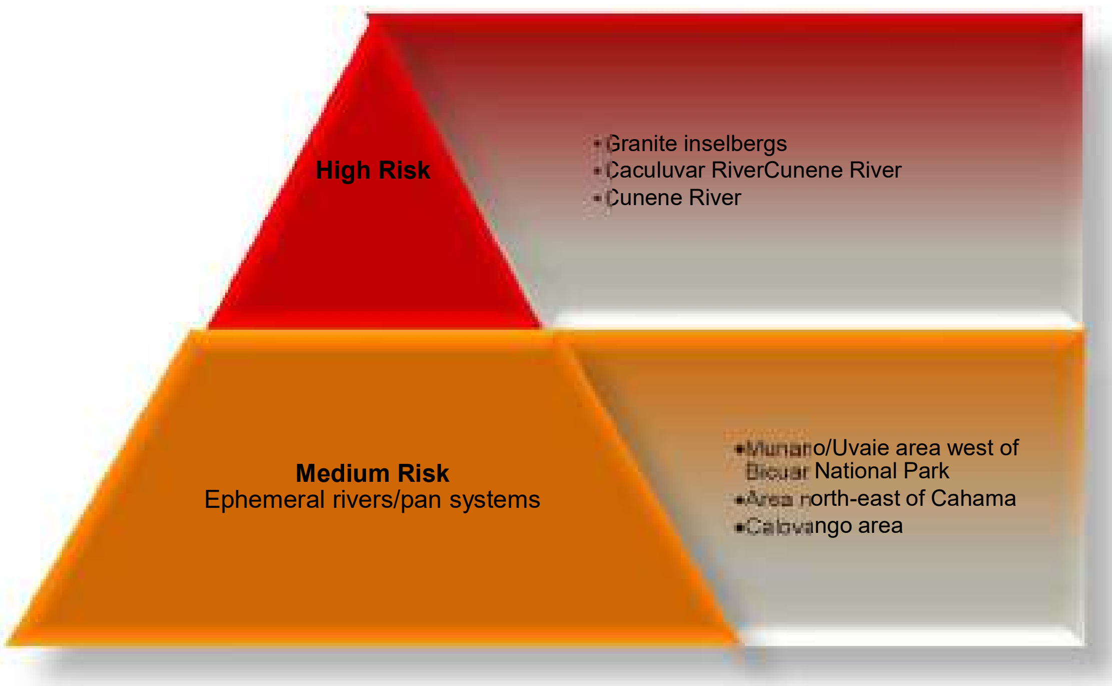

Figure 6.5: Avifauna: sensitive areas

Avifaunal species that are expected to be negatively affected by the transmission line include:

- Birds flying at transmission line height – e.g. bustards, swifts, sandgrouse, ravens, raptors and aquatic and marine species;
- Birds with nocturnal flight movements – e.g. Palaearctic migrants and wetland birds;

- Birds following certain geological and/or landscape features such as rivers, mountain ranges, etc. whilst foraging and/or migrating – e.g. aquatic/marine species and raptors; and
- Birds attracted to the area during rainfall events, like bustards, and to temporary water sources in ephemeral rivers/drainage lines, such as aquatic/marine species.

Transmission line-sensitive bird species (Scott and Scott n.d.) known/expected to occur in the general area include:

African fish eagle	African marsh harrier	Bateleur	Black stork	Booted eagle
Kori bustard	Marabou stork	Martial eagle	Peregrine falcon	Rufous-bellied heron
Southern ground hornbill	Tawny eagle	Verreaux's eagle	White-backed vulture	White-headed vulture

Other important transmission line-sensitive bird species (Scott and Scott n.d.) that may pass through the area from time-to-time, although do not occur in the area permanently, include:

African fish eagle	African marsh harrier	Bateleur	Bittern	Blue crane
Cape vulture	Crowned crane	Great white pelican	Greater flamingo	Lesser flamingo
Maccoa duck	Pallid harrier	Saddle-billed stork	Slaty egret	Wattled crane

Nest-induced faulting caused by birds (Scott and Scott n.d.) known/expected to occur in the general area include:

Pied crow	Red-billed buffalo-weaver	Eagles	Vultures	Herons – large

The following factors influence the collision risk for birds (van Rooyen 2003):

- Voltage levels – i.e. correlation between physical size of bird and collision risk;
- Body size and flight behaviour – i.e. birds with a heavy body size and small wing surface are more prone to collisions;
- Flight height and habitat use – i.e. short distance, low altitude, frequency of overhead structures;
- Age (i.e. young birds more prone to collisions);
- Resident versus migratory birds (i.e. movement into unfamiliar terrain increases collisions);
- Weather (i.e. inclement weather increases collisions);

- Time of day (i.e. nocturnal movement increases collisions);
- Land use (i.e. cultivated areas attract birds); and
- Topography (i.e. mountains/rivers/shorelines act as corridors).

Bird streamers[1] by larger birds (e.g. vultures, herons, eagles, storks, etc.) are also known to cause power outages on 400 kV transmission lines, dependent on the design structure, e.g. V or open transmission line design = higher streamer risk (van Rooyen 2003). The critical distance required for protection from bird streamers, is just <1 m, on either side of the 400 kV conductor bundle (van Rooyen 2003). Nesting platforms placed in the waist of tower structures also minimise streamer outages.

Species that could potentially be affected by the proposed project once operational, and are at greatest risk, would be those larger species flying at transmission line height (e.g. eagles, vultures, greater and lesser flamingos, and the great white pelican); nocturnal travellers (e.g. flamingos and Palaearctic species) and species potentially visiting the area for roosting/foraging, etc. (e.g. bustards, eagles, vultures, herons).

Although very little is known regarding the actual flight paths used by the birds frequenting the general area, Figure 6.6, Figure 6.7 and Figure 6.8 indicate potential flight paths along the proposed ANNA corridor.

1 Streamers are long "streams" of excrement from large birds that are often expelled as a bird takes off from a perch

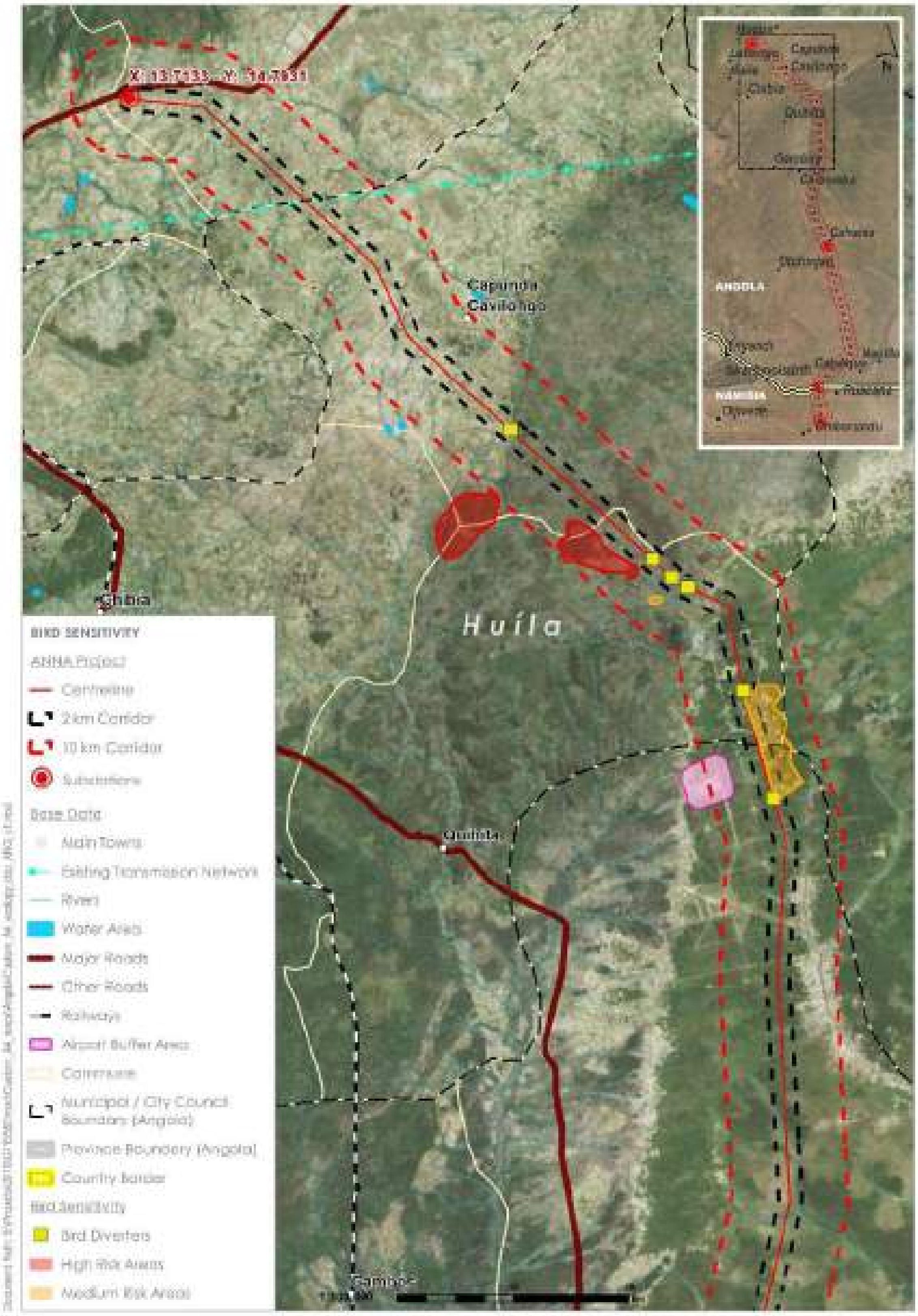

Figure 6.6: Important habitats/areas for avifauna (Lubango to Gambos)

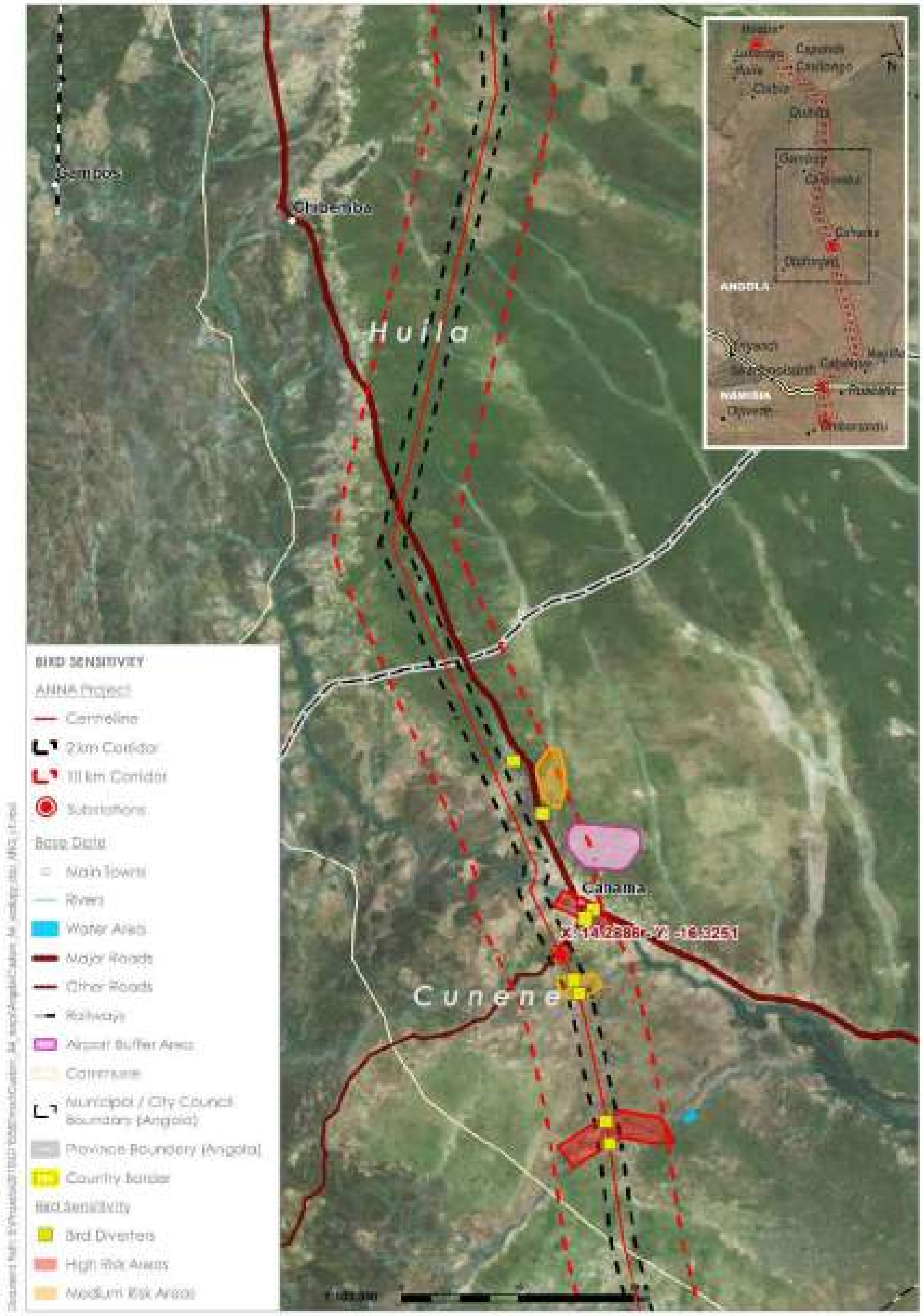

Figure 6.7: Important habitats/areas for avifauna (Gambos to Cahama)

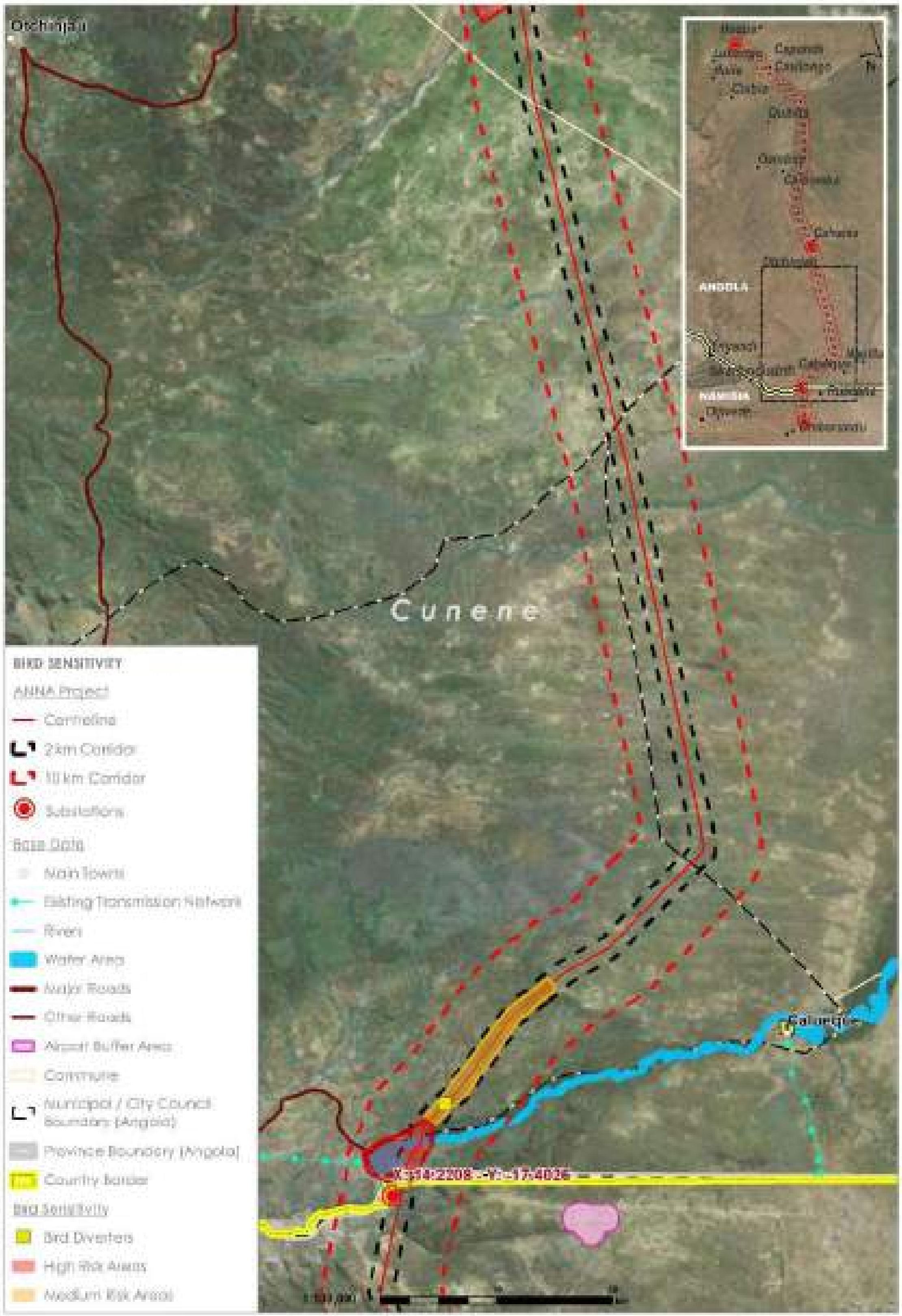

Figure 6.8: Important habitats/areas for avifauna (Otchinjau to Namibia)

In all these areas, mitigation for avifauna is required, which entails the application of bird avoidance measures, e.g. coils, flappers. In these areas, once there is more detail on the final line route, the pre-construction walk-down must inform what specific mitigation measures should be applied in defined lengths of segments of the proposed 400 kV transmission line. As a preliminary approach, Figure 6.6, Figure 6.7 and Figure 6.8 indicate the location of the areas were bird flight diverters should be considered.

6.3.2.2 Potential impacts and mitigation

6.3.2.2.1 Disturbance of avifaunal habitat

The potential disturbance of avifaunal habitat during construction, is described below.

Table 6.34: Construction Impact: Disturbance of avifaunal habitat

Phase	Construction	
Impact description	Construction work has the potential to result in the disturbance and potential loss of avifaunal habitat. This is valid for the pylon locations, access road and clearing of trees within the servitude. However, no unique/important species is exclusively associated with the proposed development area, and they are not expected to be adversely affected by the access roads associated with the new transmission line.	
Mitigation measures	• The project final design must ensure that all infrastructure within the vicinity of the Bicuari National Park are kept at a minimum distance of 500 m of this protected area and existing tracks are to be used. If there is any need to deviate from the proposed alignment, this change can only occur west of the current centreline which is further away from the Park (refer to Figure 5.51). • During construction, no activities are to interference with the Bicuari National Park. This includes the location of any camps, accommodation or roads. • Avoid sensitive habitats, namely the Cunene and Caculuvar Rivers, ephemeral drainage lines and fountains, and associated riparian vegetation, rocky ridges/inselbergs, etc. (refer to Section 5.3.2.5), which will be informed by a pre-construction walk-down; • Avoid felling of habitat trees (especially trees with nests and known perching sites such as large and/or dead trees); • Avoid disturbing birds, especially raptors, at breeding sites; • Avoid all 'poaching' activities (e.g. egg and bird collection); • Rehabilitate all disturbed areas; and • Implement and enforce a contractor's Code of Conduct.	
Phase	**Without mitigation**	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Brief**	**Immediate**
Extent	**Limited**	**Limited**
Magnitude	**Low**	**Negligible**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Almost certain / Highly probable**	**Likely**
Confidence	**Medium**	**Medium**
Reversibility	**High**	**High**
Resource irreplaceability	**Low**	**Low**
Comment on significance	The contractor's commitment to apply recommended measures reduces the impact, but this requires monitoring to ensure that measures are in fact implemented.	
Cumulative impacts	Further developments such as transmission lines, Baynes Dam, large farms with irrigation activities, and exploration and mining activities, may contribute to a minor (-) cumulative impact, as the increase in infrastructure can to result in increased mortalities and habitat destruction.	

6.3.2.2.2 Avifaunal mortalities

The potential for avifaunal mortalities during operation is described below.

Table 6.35: Operational Impact: Avifaunal mortalities

Phase	Operational	
Impact description	Birds risk collision and electrocution from operational overhead transmission lines. Species potentially affected by the operational lines, and at greatest risk, would be those larger species flying at pylon height (e.g. eagles, vultures, greater and lesser flamingos and the great white pelican); nocturnal travellers (e.g. flamingos and Palaearctic species) and species potentially visiting the area for roosting/foraging, etc. (e.g. bustards, eagles, vultures and herons). Large birds are also at risk of electrocution as a result of bird streamers (e.g. vultures, herons, eagles, storks, etc.). High risk areas are associated with perennial and ephemeral rivers, and mountainous terrain. These areas are indicated in Figure 5.60, Figure 5.61 and Figure 5.62. However, none of the unique/important species are exclusively associated with the proposed development area, and are not expected to be adversely affected by the access road associated with the proposed new transmission line infrastructure.	
Mitigation measures	• Bird avoidance measures (e.g. coils, flappers) must be applied to the proposed 400 kV transmission line in the following areas (Figure 6.6, Figure 6.7 and Figure 6.8): - **High Risk**: Cunene River; Caculuvar River and Granite inselbergs - **Medium Risk**: the ephemeral rivers/pan systems in Munano/Uvaie area (west of the Bicuar National Park), north-east of Cahama and in the Calovango area. • Initiate a bird collision monitoring programme during operation to determine the success of the bird avoidance mechanisms.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Permanent**	**Short term**
Extent	**International**	**Regional**
Magnitude	**High**	**Low**
Significance	**MAJOR (-)**	**MODERATE (-)**
Probability	**Certain / definite**	**Certain / definite**
Confidence	**High**	**High**
Reversibility	**Medium**	**High**
Resource irreplaceability	**Medium**	**Medium**
Comment on significance	Without mitigation, the impact is expected to be major (-) in sensitive habitats e.g. the Cunene and Caculuvar Rivers, ephemeral drainage lines and fountains, and associated riparian vegetation, rocky ridges/inselbergs, etc. – refer to Section 5.3.2.5.	
Cumulative impacts	Further developments such as transmission lines, Baynes Dam, large farms with irrigation activities, and exploration and mining activities, may contribute to a moderate (-) cumulative impact, as the increase in infrastructure could result in increased mortalities and habitat destruction.	

6.3.3 Ecosystem services

Although the proposed transmission line is not expected to negatively impact most of the recognised ecosystem services within the Huila and Cunene Provinces (refer to Section 5.3.3), some could potentially be affected if not addressed adequately during all stages of project development. These ecosystem services are described below.

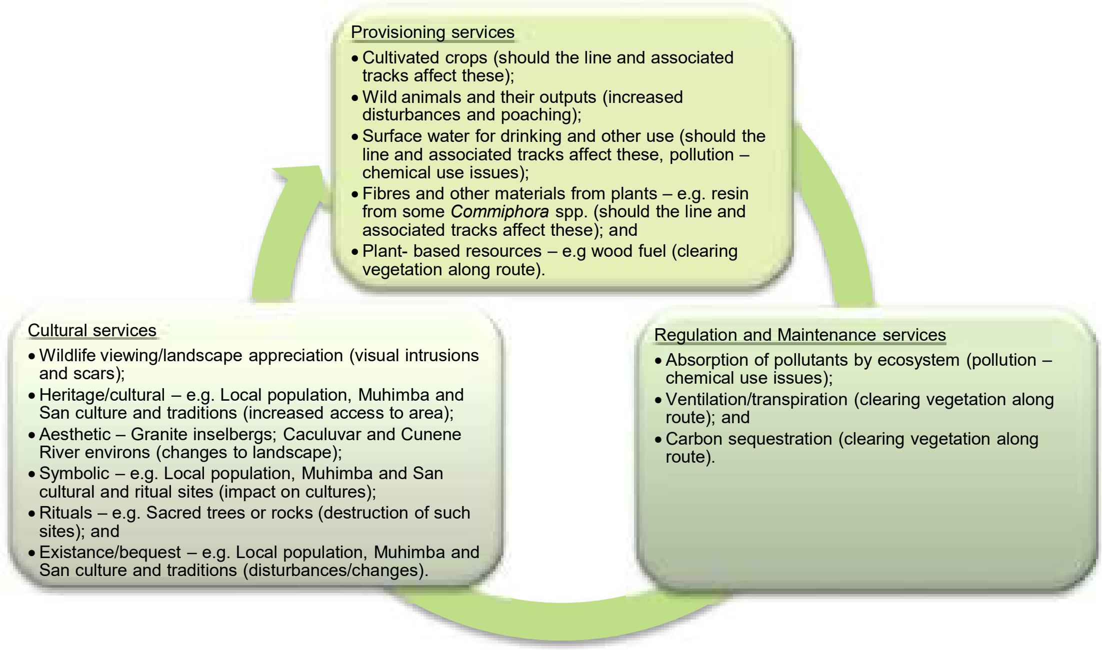

Figure 6.9: Affected ecosystem services

Ecosystem services loss associated with the proposed ANNA project would be localised along the overall corridor. The most important ecological ecosystem services in the study area are viewed as provisioning services, such as providing food, water, game meat and crops. Impacts include disturbances to vertebrate fauna (avifaunal mortalities and increased poaching), pollution and flow disturbances of surface water (erosion and chemical use), destruction of important plants such as the Commiphora spp. which has commercial value as a perfume) and plant-based resources (e.g. wood fuel) and crops. Impacts on regulation and maintenance services include pollution issues (chemical use) and impacts on ventilation/transpiration/carbon sequestration (as a result of vegetation clearing). Cultural services may also be compromised if stakeholder engagement is inadequate.

Table 6.36 and Table 6.37 summarise the envisaged impacts expected to occur (ecosystem services loss/disturbance is closely linked to habitat loss/disturbance).

Table 6.36: Construction Impact: Ecosystem services

Phase	Construction
Impact description	The impact from pylon infrastructure is not expected to be significantly detrimental to ecosystem services as the footprint of each pylon is relatively small and not expected to impact services, especially if the proposed mitigation measures are followed. Access roads are not expected to be highly detrimental to ecosystem services unless croplands, important species and heritage areas, and wetland areas, are drained for the purposes of creating/improving access, and/or roads are built up (raised), thus altering the flow of water. The impact associated with the implementation of the Cahama substation is not expected to be detrimental to ecosystem services. The development footprint at the substation site is relatively small (~6 ha), it is not associated with a pristine habitat, but rather a disturbed area (i.e. agricultural activities and tracks), and not expected to impact ecosystem services negatively, especially if the proposed mitigation measures are followed. None of the identified ecosystem services is exclusively associated with the proposed development area and the project footprint area is not expected to contribute to major ecosystem services loss, if the proposed mitigation measures are implemented.
Mitigation measures	• Avoid fields and cultivation areas; • Prevent poaching activities; • Prevent impacts on water sources;

Phase	Construction	
	• Avoid the destruction of important tree species; • Avoid excessive clearing of vegetation along the transmission line corridor. Limit clearing operations to access routes only and avoid clear-felling the entire servitude area; • Avoid the destruction of any local cultural and ritual sites (refer to Section 6.4.2.2); • Use local workers with the same culture where possible and/or include respect for cultural differences during environmental awareness training; and • Implement erosion control, especially in areas with fields/crops or in/adjacent to water sources and other important species and habitats.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Permanent**	**Immediate**
Extent	**International**	**Limited**
Magnitude	**Moderate**	**Very low**
Significance	**MODERATE (-)**	**NEGLIGIBLE (-)**
Probability	**Almost certain / Highly probable**	**Likely**
Confidence	**Medium**	**Medium**
Reversibility	**Medium**	**High**
Resource irreplaceability	**Medium**	**Medium**
Comment on significance	The influx of people along the route as an indirect impact of the presence of the line, could exacerbate the loss of unique floral/faunal habitats. However, the existing access route will be used as far as possible so as not to create additional access opportunities.	
Cumulative impacts	Further developments such as transmission lines, Baynes Dam, large farms with irrigation activities, and exploration and mining activities, may contribute to a negative cumulative impact that could have moderate to major significance (depending on the project's characteristics, size and attention to environmental and social issues), as increased developments could result in increased damage to the various ecosystem services.	

The potential impacts on ecosystem services during operation, is described below.

Table 6.37: Operational Impact: Ecosystem services

Phase	Operational	
Impact description	The ecosystem services mentioned in Table 6.36 could also be affected during operation. The clearing of vegetation and plants, which will be initiated during the construction phase, would be extended throughout operation to maintain the servitude, namely in the form of control of large trees within the servitude. Often crops are established by communities within the servitude and these could be damaged during maintenance activities.	
Mitigation measures	• Chemicals should only be used as a last resort and, if needed, be used judiciously if/when used for access route maintenance; • Only remove individual trees that pose a threat to infrastructure (not clear-fell the route); and • Implement erosion control, especially in areas with fields/crops or in/adjacent to water sources and other important species and habitats.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Ongoing**	**Brief**
Extent	**International**	**Limited**
Magnitude	**Low**	**Low**

Phase	Operational	
Significance	MODERATE (-)	NEGLIGIBLE (-)
Probability	Almost certain / Highly probable	Likely
Confidence	Medium	Medium
Reversibility	High	High
Resource irreplaceability	Medium	Low
Comment on significance	The influx of people along the route as an indirect impact of the presence of the line, may exacerbate the loss of unique floral/faunal habitats. However, the existing access route will be used as far as possible so as not to create additional access opportunities.	
Cumulative impacts	Further developments such as transmission lines, Baynes Dam, large farms with irrigation activities, and exploration and mining activities, may contribute to a negative cumulative impact that could have moderate to major significance (depending on the project's characteristics, size and attention to environmental and social issues), as increased developments could result in increased damage to the various ecosystem services.	

6.3.4 No-Go alternative

The No-Go alternative anticipates changes to the biophysical environment that would occur in the absence of the proposed project. The environment is not static, with the main drivers of change expected to be overgrazing, abstraction of groundwater, climate change (drought) and poaching (Harper-Simmonds *et al*. n.d.).

However, the biggest driver of change would most likely be human activities that alter the habitat to suit people's needs, e.g. crop and stock farming activities. In this scenario, avifauna would not be negatively affected by transmission lines, while flora, vertebrate fauna and sensitive habitats would be affected by changes in land use, etc. Therefore, the anticipated impact on flora, fauna, sensitive habitats and ecosystem services, of the No-Go scenario on the biophysical environment, is expected to be minor (-) over time. As for avifauna, the anticipated impact of the No-Go scenario is expected to be neutral.

6.3.5 Summary

It was found that none of the unique/important species expected to occur in the DAI, is exclusively associated with the study area, and that the area expected to be affected by the project does not contain any critical habitat as defined by the DBSA and the IFC.

The project will result in the clearing of vegetation, and other disruptive activities, during the construction phase so as to enable the installation of the infrastructure, including the pylons and access roads. The presence of a workforce also has the potential to impact on flora and fauna through behaviour such as illegal collection of plant or animal species, collection of firewood, making of fires, driving offroad, etc. These construction impacts are rated as being of negligible significance, with mitigation, with the greatest risk (if unmitigated) being posed to unique floral/faunal species in sensitive habitats, including the Cunene and Caculuvar Rivers, ephemeral drainage lines and fountains and associated riparian vegetation, rocky ridges/inselbergs, etc. (refer to Section 5.3.2.5). Mitigation is primarily the avoidance of these sensitive areas, which can be identified though a pre-construction walk-down to inform the detailed design.

The development of roads in wetlands has the potential to impact water flows and amphibian habitat. Monitoring of reptile and mammal mortalities is also recommended. Other measures include a contractor's Code of Conduct, and rehabilitation of disturbed areas.

During operation, the maintenance of the transmission line will result in clearing of large trees, either manually (or with herbicides as a last resort only) with expected resultant impacts on habitat, and therefore also fauna. Again, the greatest risk would to be to unique floral/faunal species in sensitive habitats, if unmitigated. Mitigation includes avoidance of sensitive areas (as identified during construction) and avoidance of certain tree species during maintenance operations. Environmental awareness for the RNT staff is important, including the making of fires, collecting of firewood and specific plants for trade, etc.

A clearance area (height) is required to prevent large mammals (giraffe and elephant) from being electrocuted, and skirtings of loose rock around pylons could prevent elephants from using the pylons as rubbing posts. Monitoring of mortalities is a key measure to ensure that fauna is not impacted over time.

As for avifauna, none of the unique/important species expected to occur in the DAI, is exclusively associated with the study area. However, a number of threatened species are expected to pass through the area. The clearance of vegetation, and other disruptive activities, during construction, to enable the installation of the infrastructure, including the pylons and access road, could have an impact of negligible negative significance, with mitigation. Mitigation includes the avoidance of sensitive habitats for temporary work areas and permanent infrastructure, not felling habitat trees (especially trees with nests), rehabilitation of disturbed areas and also controlling contractor behaviour. During operation, the potential exists for negative impacts of major significance to occur, if mitigation is not applied, specifically with regards to avifauna. Recommended mitigation includes the installation of bird avoidance measures (e.g. coils, flappers) in identified sensitive locations (flightpaths along rivers and mountains), and to undertake a bird collision monitoring programme during operation to determine the success of these bird avoidance mechanisms. However, it is emphasised that there are no fatal flaws, i.e. the identified impacts can be mitigated and so there is no portion of the project corridor that can be considered non-viable.

Ecosystem services are primarily provisioning (e.g. for livestock, wild animals, plants for material and for energy use, surface water and groundwater) and regulation and maintenance (mitigation of pollution and ventilation/transpiration/carbon sequestration). These impacts are assessed to be of negligible significance, with the mitigation already described above, and such services are represented elsewhere. With regards to provisioning trees, it is recommended to only remove bigger trees that could cause interference along the route, and leave smaller trees intact, and to pay attention to erosion control in areas such as agricultural fields, water sources and important habitats.

Overgrazing by domestic livestock (mainly cattle) is likely to have the biggest impact on the local biodiversity in the vicinity of water sources, especially in the southern part of the corridor, and improved livestock grazing management would enhance the local environment and be a potential area of opportunity worth investigating. Further areas of opportunity for net benefit from the project are included in Section 8 - Conclusions and final recommendations.

6.4 Socio-economic environment

6.4.1 Demographic and socio-economic aspects

6.4.1.1 Overview

The impact assessment presented in this section assumes the following relevant baseline conditions and project design that may potentially influence analysis:

Baseline conditions

- The territory has a low population density, marked by the presence of communities mostly of Mumuila origin, but the presence of two ethnic minorities, considered by the international community as indigenous peoples, the *Mudimba* and the *San,* should not be excluded. These communities live primarily in rural settlements, distributed along the waterways, in two geographical areas that are distinguished by their organisation and socio-economic dynamics:
  - The northern and central sectors of the DAI (up to the village of Cahama): most densely populated, tend to have concentrated rural settlements. The communities present are mainly engaged in subsistence agriculture, complemented by livestock (mainly cattle), according to a

fixed grazing system in the pasture areas surrounding their dwellings (agro-pastoral communities); and

- The southern sector of the DAI (from the village of Cahama to the Namibian border): sparsely populated, with considerable spans of sparsely-populated territory. The existing communities are mainly devoted to the raising of livestock (mainly cattle), according to a transhumance grazing system (pastoral communities). The transhumance corridors lead to the inner study area, which is better provided with natural resources

- Strongly dependent on the natural environment (that provides firewood and material for the construction of their dwellings and grassland areas for their cattle), these communities are extremely vulnerable to climatic extremes (e.g. drought) and food insecurity. This reality tends to be most severe in pastoral communities living in the southern sector, that have less favourable natural conditions (semi-arid and limited natural resources), and who are also subject to the pressure exerted by farms on the transhumance corridors.
- The unemployment rate is high, being higher amongst women and in the urban areas.
- These communities have no access to electricity and water, using firewood as the main source of fuel for domestic activities and unsafe surface water sources for domestic needs and for watering of cattle. Most also have limited access to health and education facilities.
- Most of these communities are considered multidimensionally poor, and a significant percentage live in severe poverty.
- The assessed communities are actively aware of, although not used to, such projects. Positive attitudes towards the project have been confirmed, as long as there is effective community involvement and inclusive communication in decision-making, as well as fair compensation for potentially-affected populations who will not benefit directly from the project.

Project design elements

- The project is currently in the concept design phase and detailed design is not yet available. The project allows for the final design to take into account socially-sensitive areas and to avoid, or minimise as far as possible, impacts on dwellings, associated structures and livelihoods.
- The required number of skilled and unskilled and local/non-local workers is not known at this stage of the project, and will be confirmed at a later stage.
- The project will require specific restrictions within the 55 m servitude area (22.5 m on either side along the length of the line, approximately 331 km), within which construction of new dwellings and structures will not be allowed, established for purposes of safety and security with regards to the high voltage transmission lines. This servitude will be completely demined and, during the construction phase, right-of-way will not be allowed within the entire area where construction works are under way. Once all construction activities are complete within a certain area, the right-of-way will be re-established. However, within this servitude, an estimated 12 m width must be totally cleared of vegetation and obstacles to ensure the presence of a service road that provides access (during construction and maintenance) to the line throughout its lifespan. Besides the right-of-way of the electric line, there will also be a right-of-way for the Cahama substation, in order to guarantee the necessary security conditions.
- Information on land requirements and the number of people/social groups potentially affected, is not available at this stage. This will be taken into account during the Resettlement Action Plan (RAP), which will be developed once the location of the various project components has been finalised. However, an RPF has been developed as part of this ESIA.
- As the locations of the construction camps are unknown at this stage of the project, it was not possible to assess the potential impact associated with their installation. However, mitigation measures are proposed to avoid or minimise potential impacts on the socio-economic environment.

- There is public concern and inconclusive evidence about the potential health effects associated with exposure to Electromagnetic Fields (EMFs). However, no empirical data demonstrates adverse health effects from exposure to typical EMF levels from power transmission lines. This is therefore not considered as an impact, but as a mitigation measure it is proposed to monitor the EMF levels.
- Only community land (which cannot be bought or sold) is expected to be affected. Therefore, the land devaluation associated with the presence of the line does not apply to the present project.

6.4.1.2 Potential impacts and mitigation measures

Based on a benchmark review, as well as on issues identified in this report, the following impacts were considered important to be assessed:

Economic impacts

- Job creation;
- Opportunities for local sourcing of good and services; and
- Increased availability of electricity.

Land and livelihood impacts

- Physical displacement as a result of loss of shelter;
- Economic displacement as a result of loss of livelihoods; and
- Economic displacement as a result of loss of natural resources.

Health and safety impacts

- Improved safety after demining activities;
- Increased risk of contracting diseases;
- Increased risk of traffic and work-related accidents; and
- Increased risk related to the presence of the transmission line.

Quality of life impacts:

- Discomfort generated by construction activities;
- Interference in/disruption of the daily lives of local communities;
- Increased accessibility to the transmission line corridor; and
- Exposure of the area to external influences.

6.4.1.2.1 Positive Impacts from project

The potential impacts related to job creation are described below.

Table 6.38: Construction Impact: Job creation

Phase	Construction
Impact description	The construction of the project will involve the temporary contracting of labour (skilled and unskilled), the numbers of which will be confirmed at a later stage by the entity responsible for the execution of the works (i.e. the contractor). It is expected that, for the more specialised work, there is a need to resort to skilled labour, possibly sourced from geographical areas outside the study area (both the DAI and IAI are largely rural, with less activity and expertise in the construction sector). For some low-skilled jobs (especially for clearing of the 12 m strip within which the transmission line will be constructed), the project should source local labour, a reality that will (even if only temporarily) bring benefits to the social structure of the local population, reducing the unemployment rate and increasing the income of people and their families. Job

Phase	Construction	
	creation may also be achieved through indirect employment of contractors and suppliers (refer Section 6.4.1.2.2). Once construction is over, operation of the transmission line will be handed over to RNT 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, and consequently no migration of non-local workers is expected.	
Mitigation measures	• 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 transmission line will be given priority for low-skilled jobs. Quotas for local employment should be set based on the availability of appropriate local skills, and this information should be sourced from the municipal and communal authorities by undertaking an independent skills audit at the outset. The quota for local employment must include a minimum of 10% - 5% for women and 5% for men. The contractor's contract should specify that these positions may only be filled by persons outside of these categories if it can be demonstrated that no suitable persons are recorded in the skills register to fill these positions, and that no other candidates could be identified through local advertising. All workers should be adequately trained for the proper performance of their functions; • The contractor/s 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 (included in SEP, Annexure A of the ESMP – Vol.III); and • 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. 07/2015 of 15 Jun), in the IFC's Performance Standard 2: Labour and Working Conditions, and in the DBSA's ESSS 6: Labour and Working Conditions.	
	Without mitigation	**With mitigation**
Nature	**Positive**	**Positive**
Duration	**Short term**	**Short term**
Extent	**Regional**	**Regional**
Magnitude	**High**	**High**
Significance	**MODERATE (+)**	**MODERATE (+)**
Probability	**Certain / definite**	**Certain / definite**
Confidence	**High**	**High**
Reversibility	**High**	**High**
Resource irreplaceability	**Low**	**Low**
Comment on significance	Not applicable	
Cumulative impacts	It is unlikely that another construction project will occur simultaneously with the construction works of the ANNA project. However, if this happens, the cumulative impact of job creation from construction of the other projects can increase, which could be of moderate (+) significance.	

The potential impacts related to sourcing of local goods and services, are described below.

Table 6.39: Construction Impact: Sourcing of local goods and services

Phase	Construction
Impact description	During the construction phase, hiring of non-local labour may result in the temporary migration of workers, and a subsequent temporary increase in population numbers. The presence of these workers will imply a greater consumption of goods and services related to catering, commerce and accommodation. Hence, an increase in local companies' turnover is expected, associated with the construction process

Phase	Construction	
	(goods and services supply, related to transportation, construction materials, communication, etc.). Due to the increased demand of services and goods, an indirect stimulation of the local economy is expected.	
Mitigation measures	• 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. transportation, construction materials from mining operation located in the vicinity of the study area, waste management and disposal, water supply, catering, etc.), to maximise local procurement. This plan should ensure the equal and effective participation of women and men in the procurement board; and • The contractor/s 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 (included in the SEP – Anexxure A of the ESMP – Volume III).	
Assessment	**Without mitigation**	**With mitigation**
Nature	**Positive**	**Positive**
Duration	**Short term**	**Short term**
Extent	**Regional**	**Regional**
Magnitude	**Moderate**	**Moderate**
Significance	**MINOR (+)**	**MINOR (+)**
Probability	**Certain / definite**	**Certain / definite**
Confidence	**High**	**High**
Reversibility	**High**	**High**
Resource irreplaceability	**Low**	**Low**
Comment on significance	Not applicable	
Cumulative impacts	It is unlikely that other construction projects occur simultaneously with the construction works of the ANNA project. However, if this happens, the cumulative impact of job creation from construction of the other projects, can increase, which could be of minor (+) significance.	

The assessment of the impact of improved safety, as a result of the demining operations, for the communities, is presented below.

Table 6.40: Construction Impact: Improved safety after demining

Phase	Construction	
Impact description	The clearance of land mines inside the transmission line servitude will result in increased safety for the communities moving through the area.	
Mitigation measures	Not applicable	
	Without mitigation	**With mitigation**
Nature	**Positive**	**Positive**
Duration	**Permanent**	**Permanent**
Extent	**Limited**	**Limited**
Magnitude	**Extremely high**	**Extremely high**
Probability	**Certain/ definite**	**Certain/ definite**
Significance	**MAJOR (+)**	**MAJOR (+)**
Confidence	**High**	**High**
Reversibility	**High**	**High**

Resource irreplaceability	**Low**	**Low**
Comment on significance	Not applicable	
Cumulative impacts	Cumulative impacts are not expected.	

The potential impacts of the increased availability of electricity, are described below.

Table 6.41: Operational Impact: Increased availability of electricity

Phase	**Operational**	
Impact description	During project operation, socio-economic benefits are expected, associated with the expansion of the electricity supply capacity within the SADC region, enhancing the availability and reliability of electricity supply in the respective countries, and facilitating electricity trade in the SAPP grid. At the regional level, the benefits that can be expected are as follows: • Increase in the purchase and sale of excess energy and capacity across the border, and associated wheeling across both Namibia and Angola, i.e. revenue from energy import/export/wheeling activity; • Energy import to meet required demand (the demand would alternatively have had to be met by using more expensive generation sources or the development of additional generation capacity, thus it provides a mechanism to avoid the use of these expensive generation sources or defer the capital expenditure for new generation capacity); • Increase in the security of energy supply, which may result in an increase in productivity of economic activities and a reduction in the need for back-up generators, which will lead to cost savings for electricity users, as well as a reduction of CO^2 emissions in the region (~138 Tonnes per annum); and • For recipients of power, initially Xangongo, Cahama and Ondjiva, there will be significant quality of life and financial benefits. This contributes to SDGs: SDG 7: *Ensure access to affordable, reliable, sustainable and modern energy for all through providing access to affordable and reliable energy*. SDG 13: *Climate action*, is also supported as the strengthened network takes into account climate change scenarios and droughts. Furthermore, the project will facilitate the import of power from the north and assist with the efficiency of the transmission grid. Secondary to these goals, improved access to clean energy has associated health benefits which align with SDG 3: *Good health and well-being*. Lastly, the overarching goal of *No poverty* as SDG 1, is also supported, in that communities in a climate vulnerable country such as Angola will have improved access to electricity as a basic service. As a national transmission infrastructure, the socio-economic benefits will not only be felt locally, since the project itself does not directly contribute to the reinforcement of the local distribution network. However, in the long run, it will help to alleviate the current electricity supply constraints and contribute towards energy security of supply by enhancing the local distribution of electricity.	
Mitigation measures	Publicise/broadcast the importance of the project in the long term (included in the SEP).	
	Without mitigation	**With mitigation**
Nature	**Positive**	**Positive**
Duration	**Permanent**	**Permanent**
Extent	**International**	**International**
Magnitude	**Extremely high**	**Extremely high**
Probability	**Certain / definite**	**Certain / definite**
Significance	**MAJOR (+)**	**MAJOR (+)**
Confidence	**High**	**High**
Reversibility	**Medium**	**Medium**
Resource irreplaceability	**Low**	**Low**
Comment on significance	Not applicable	

Phase	Operational
Cumulative impacts	The presence of the project, together with existing transmission lines, will have cumulative impacts on the expansion of the RNT transmission network, contributing positively to the benefits that network expansion will bring to the country, which could result in a major (+) significance.

The potential operational impacts on communities as a result of the increased/improved accessibility to the transmission line corridor, are described below.

Table 6.42: Operational Impact: Increased accessibility to the transmission line corridor

Phase	Operational	
Impact description	The creation/improvement of access roads to the project area will increase local accessibility, benefitting mobility and communication between remote villages and municipal or communal centres.	
Mitigation measures	Not applicable	
	Without mitigation	**With mitigation**
Nature	**Positive**	**Positive**
Duration	**Permanent**	**Permanent**
Extent	**Limited**	**Limited**
Magnitude	**Moderate**	**Moderate**
Probability	**Certain**	**Certain**
Significance	**MINOR (+)**	**MINOR (+)**
Confidence	**High**	**High**
Reversibility	**High**	**High**
Resource irreplaceability	**Low**	**Low**
Comment on significance	Not applicable	
Cumulative impacts	The creation/improvement of access roads to the project area, combined with the development of main communication routes, will increase the mobility and communication between remote villages and municipal or communal centres, contributing to a minor (+) cumulative impact.	

6.4.1.2.2 Negative impacts associated with the project

The potential impacts of physical displacement, are described below.

Table 6.43: Construction Impact: Physical displacement

Phase	Construction
Impact description	Due to the land acquisition process required for the implementation of the project components, interference with rural settlements in specific areas of the DAI is expected, especially in its northern sector and surrounding Cahama village, where population density is higher. This implies the removal of all dwellings (associated structures and livelihoods) and the subsequent physical displacement of affected people/social groups to new locations (involuntary resettlement), which may lead to: • Changes at the individual and family level, namely disturbances in established social relations (i.e. breakdown of social network); • Modification of movement patterns (distance to schools, health units, grazing areas, water sources, etc.); and • Loss of income and livelihoods, which are essential for the survival of the affected people/social groups, and which may lead to food deprivation (food insecurity) in the case of the most vulnerable groups.
Mitigation measures	• The number of people/social groups affected, is not known at this stage of the project, and will be confirmed during the final design of the project, with a commitment to avoid, or minimise, physical displacement. For this purpose, and after the demining activities, a detailed social survey of the corridor directly

Phase	Construction	
	affected by the final alignment in terms of access, pylon locations and construction camps, should be undertaken to avoid, where possible, or maximise the distance from, existing shelters. Priority should be given to the use of existing access roads/tracks and areas that have already been disturbed; • The accesses, pylon locations, and final location of the Cahama substation and construction camps, should be determined in collaboration with the local Sobas and the affected people/social groups; • A Resettlement Policy Framework (RPF) has been prepared as part of the ESIA documentation, to guide the preparation of a RAP upon confirmation of the detailed design. The RAP will guide the resettlement process to ensure that appropriate compensation is provided to the people/social groups that will be directly affected. It will be prepared in line with Angola's legal framework and with international lenders' standards for socially sustainable development (IFC's PS 5 and 7, and DBSA's ESSS 4 and 5, related to land acquisition and involuntary resettlement, and indigenous peoples); • As set out in the RPF, the resettlement should be implemented with a high level of involvement from the local Sobas, affected people/social groups and local host communities, to ensure that the process is informed by the social and economic needs, constraints and expectations of all involved (included in the SEP and in the VGP, and taking into account an Informed Consultation and Participation – ICP, and Free, Prior, and Informed Consent – FPIC, of the affected communities); • Provide a Grievance Redress Mechanism for the handling of complaints/ requests, and for information that may prompt the need for implementation of new measures; • A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances, and should be preferably locals and be familiar with the local language and customs.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Permanent**	**Permanent**
Extent	**Limited**	**Very limited**
Magnitude	**Extremely high**	**Moderate**
Probability	**Certain**	**Probable**
Significance	**MAJOR (-)**	**MINOR (-)**
Confidence	**High**	**High**
Reversibility	**Low**	**High**
Resource irreplaceability	**High**	**Low**
Comment on significance	Not applicable	
Cumulative impacts	It is unlikely that other construction projects occur simultaneously with the construction works of the ANNA project. However, should this happen, the cumulative impact of the physical displacement as a result of construction of the other projects, may increase the project's significance to that of major (-).	

The potential impacts of economic displacement due to the loss of livelihoods, are described below.

Table 6.44: Construction Impact: Economic displacement – loss of livelihoods

Phase	Construction
Impact description	When no physical displacement is necessary, but access to land is restricted (partially or totally), economic displacement can occur. During the construction phase, in specific areas of the DAI, some specific restrictions may be required within the servitude area, which can interfere with livelihood areas (grasslands and/or crops, which tend to be clustered close to human settlements): • Creation of an access road (in areas where no adjacent servitude and access road exists) requiring clearing of vegetation;

Phase	Construction	
	• Complete removal of vegetation and crops inside the maintenance corridor of the line (12 m), and within the pylon (~40 m x 40 m in construction phase) and Cahama substation footprints (permanent loss, restriction extends to the operational phase); and • Removal of vegetation and crops inside the construction camp (0.5 ha) (temporary loss). These restrictions will consequently cause the loss of income and livelihoods, which are essential for the survival of the affected people/social groups, and which may lead to food deprivation (food insecurity) for the most vulnerable groups.	
Mitigation measures	• The total areas required, and the number of the affected people/social groups, is unknown at this stage of the project, and will be confirmed during the final design, with a commitment to avoid, or minimise, economic displacement. For this purpose, and after the demining activities, a detailed social survey of the corridor directly affected by the final alignment, in terms of access, pylon locations and construction camps, should be undertaken to avoid (where possible), or minimise the distance from, livelihood areas. Priority should be given to the use of existing access roads/tracks and already-disturbed areas. Should there be a need to create new access routes, livelihood resources (e.g. crops or forests) should not be bisected, to avoid fragmentation of areas; • The access routes, pylon locations and construction camp/s should be defined in consultation with the local Sobas and people/social groups that use the land; • The RAP process will guide the compensation for loss of livelihoods. Based on the needs of local communities, priority will be given to compensation by provision of an asset rather than monetary compensation. Due to the lack of water, which is the community's primary concern (mainly due to the current drought), the construction of water infrastructure (both for supplying the communities and for livestock) can be a significant compensation measure for communities. However, the type of compensation for losses shall be agreed with the Traditional Authorities (included in the SEP and in the VGP, to ensure ICP and FPIC of the affected communities); and • Provide a Grievance Redress Mechanism for the handling of complaints/ requests, and of information that may prompt the need for implementation of new measures. • A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances, and should be familiar with the local language and customs.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Permanent**	**Permanent**
Extent	**Limited**	**Very limited**
Magnitude	**Extremely high**	**Moderate**
Probability	**Certain**	**Probable**
Significance	**MAJOR (-)**	**MINOR (-)**
Confidence	**High**	**High**
Reversibility	**Low**	**High**
Resource irreplaceability	**High**	**Low**
Comment on significance	Not applicable	
Cumulative impacts	It is unlikely that other construction projects occur simultaneously with the construction of the ANNA project. However, should this occur, the cumulative impact of the loss of livelihoods as a result of construction of the other projects, may increase the project impact to that of major (-) significance.	

The potential impacts of economic displacement due to the loss of resources, are described below.

Table 6.45: Construction Impact: Economic displacement – loss of natural resources

Phase	Construction	
Impact description	During the construction phase, specific restrictions (economic displacement) on forests and woodlands are expected, which provide local communities with firewood and construction material for their dwellings and grazing areas for their cattle, due to: • The creation of an access road (in areas where no adjacent servitude and access road exists) (permanent loss); • Complete removal of vegetation and crops inside the maintenance transmission line corridor (12 m), and within the pylon (~40 m x 40 m in construction phase) and Cahama substation footprints (permanent loss, restriction extends to the operation phase); • Removal of all vegetation in the construction camp areas (temporary loss, which will be recovered in operational phase); and • Right-of-way will not be allowed inside the 45 m servitude area, which can imply restrictions in the access to some grazing areas (temporary loss, which will be recovered in operation phase); The total area of woodland clearance required is not known at this stage of the project. The loss of this resource is not possible to avoid, but will be reduced, given the large availability of this resource in the study area, offering other location alternatives for the local communities to access this resource.	
Mitigation measures	• All the forested area requiring clearing will be verified during the detailed design, which is committed to prevent or minimise such economic damage. For this purpose, after demining activities, a detailed social survey will be conducted in the area directly affected by the final electric line layout. Access routes, pylons and the Cahama substation, as well as the construction camps, must avoid transhumance areas. Priority should be given to existing access routes and to areas already affected by the works; • Apply mitigation measures proposed in Section 6.3 (biotic environment) to limit vegetation clearance to the strictly required areas (to be included in the demining plan); • Compensate communities for the loss of natural resources. As per the needs of local communities, priority should be given to compensation by providing an asset rather than monetary compensation. Due to the lack of water, which is their main concern (primarily due to the current drought), the construction of water infrastructure (both for supplying the communities and for livestock) can constitute a significant compensation for communities. However, the type of compensation shall be agreed in consultation with the Traditional Authority (included in the SEPA and in the VGP, to ensure ICP and FPIC of the affected communities); and • Provide a Grievance Redress Mechanism for the handling of complaints/ requests, and for information that may prompt the need for implementation of new measures. • A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances, and should be familiar with the local language and customs.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Permanent**	**Permanent**
Extent	**Limited**	**Very limited**
Magnitude	**Low**	**Low**
Probability	**Certain**	**Certain**
Significance	**MODERATE (-)**	**MINOR (-)**
Confidence	**High**	**High**
Reversibility	**High**	**High**
Resource irreplaceability	**Low**	**Low**

Phase	Construction
Comment on significance	Not applicable
Cumulative impacts	It is unlikely that other construction projects occur simultaneously with the construction works of the ANNA project. However, if this happens, the cumulative impact of the loss of natural resources due to construction of the other projects, could increase the project impact to that of moderate (-) significance. Another possible cumulative impact is related to the presence and expansion of large cattle farms, which can limit the local population's access to transhumance zones and corridors. The impact of construction activities for this project could be increased to that of moderate (-) significance.

The potential impacts related to the increased risk of contracting diseases, are assessed below.

Table 6.46: Construction Impact: Increased risk of contracting disease

Phase	Construction
Impact description	The non-local workers (mostly men) will be away from home for an extended period of time while employed on this project. The likelihood therefore exists for sexual relationships to develop between them and local community members, and thus exposure to sexually transmitted diseases (STDs), especially HIV/AIDS. At this level, women and girls tend to constitute the vulnerable groups. The presence of non-local workers may also favour the transmission of contagious diseases such as tuberculosis in the local communities. The current environmental conditions of the study area is conducive for the development of vectors responsible for the transmission of malaria, dengue, and yellow fever, among others, and may increase the risk of non-local workers contracting these diseases. Some activities will result in changes to the physical environment, with the potential to affect the health and welfare of communities. Dust and air pollutant emissions could lead to respiratory diseases. Noise emissions could lead to conditions such as stress, headaches and migraines. The discharge of pollutants into the soil and water could lead to diseases caused by contamination such as cholera, diarrhoea and hepatitis. These emissions will be of limited duration and contained to restricted areas of the DAI, and will affect workers and people/social groups living in the immediate vicinity of the affected areas (at this level, children tend to constitute the most vulnerable group). However, significant and continuous emission levels that could induce changes in health are not expected. Should such health impacts occur, the impact will be of limited duration and restricted to the DAI, and will affect workers and people/social groups living in the immediate vicinity of the affected areas. These social pathologies may exert pressure on existing health facilities, which are already limited in capacity.
Mitigation measures	• Implement a Health and Safety Management Plan. Given the limited supply of health care in the study area, this plan should include epidemiological control measures to be implemented by the contractor/s on the construction sites to assist the workers and, in this way, avoid pressure on the existing health units. This plan should also include regular screening of communicable and STDs of all workers assigned to the site, a vaccination program to curb diseases responsive to vaccines, as well as to provide protection for workers most exposed to air pollution and noise while working; • Promote awareness activities among workers regarding water and hygiene-related diseases and STDs, especially HIV/AIDS and associated code of conduct. See mitigation in Table 6.47 relating to code of conduct and social disruption; • Locate the workers' accommodation in main villages/towns and not in the areas along the corridor, to avoid interactions between workers and communities. • Promote awareness activities among local communities (particularly women and girls) about impacts associated with the presence of non-local workers (health impacts, gender-based violence, sexual harassment, as well as the existing legislation relating to sexual harassment and rape, and trafficking in persons). Women from affected communities should be hired and trained to implement awareness-raising activities. Materials can also be designed that can be replicated on other future projects;

Phase	Construction	
	• Avoid the positioning and placement of construction camps within close proximity to schools or locations where there is a permanent presence of young women and/or female children; • Provide a Grievance Redress Mechanism for the handling of complaints/ requests, and for gathering information to assess the degree of risk perceived by local communities and consider the need for implementation of new measures. • A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances, and should be familiar with the local language and customs; and • Implement the Waste and Wastewater Management Plans to ensure that potential chemical and biological contamination from construction activities is duly addressed and controlled.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Short term**	**Immediate**
Extent	**Limited**	**Very limited**
Magnitude	**Extremely high**	**Negligible**
Probability	**Probable**	**Probable**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Confidence	**High**	**High**
Reversibility	**Medium**	**Medium**
Resource irreplaceability	**Low**	**Low**
Comment on significance	Not applicable	
Cumulative impacts	It is unlikely that other construction projects occur simultaneously with the construction works of the ANNA project. However, if this happens, the cumulative impact of the risk of contracting diseases could increase the project impact to a minor (-) significance.	

The potential construction site health and safety impacts are described below.

Table 6.47: Construction Impact: Site health and safety

Phase	Construction
Impact description	The presence of construction workers (especially non-local workers) may, intentionally or unintentionally, cause conflict with community members due to the differences in culture, beliefs, habits and rules of conduct between workers and local inhabitants. These could disrupt existing family structures and social networks by a potential temporary increase in the level of petty crime, illicit activity, use of alcohol and drugs, and unplanned pregnancies.
Mitigation measures	• Implement a Community Health and SafetyPlan, adopting reduced speed limits and with adequate signs to ensure safety and traffic conditions; maintaining access control of construction sites to prevent access to people from the surroundings; • Implement the SEP (Annexure A of the ESMP – Volume III), including prior and extended communication of the activities planned (and timeline) and the accesses to be used during the project construction phase, to enable local communities to increase perception and manage risk; • Promote awareness activities among local communities (particularly children) regarding the construction risks; • Promote awareness activities among workers about the culture, beliefs, habits and lifestyles of the local communities, and define appropriate rules of conduct. The code of conduct should apply to both contractors and RNT staff and should set out the disciplinary and legal implications of certain activities involving local communities; • Promote awareness activities among local communities about the presence of non-local workers. Women from affected communities should be hired and

Phase	Construction	
	trained to implement education and awareness-raising activities. Materials can also be designed that can be replicated on other future projects; • Implement the Demining Management Plan prior to construction activities, in consultation with the competent authorities and including the local Sobas; • Provide a Grievance Redress Mechanism for the handling of complaints/ requests, and for receiving information to assess the degree of interference perceived by local communities and to consider the need for implementation of new measures. • A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances, and should be familiar with the local language and customs.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Short term**	**Immediate**
Extent	**Limited**	**Very limited**
Magnitude	**Extremely high**	**Very low**
Probability	**Probable**	**Unlikely**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Confidence	**Medium**	**Medium**
Reversibility	**High**	**High**
Resource irreplaceability	**Low**	**Low**
Comment on significance	Not applicable	
Cumulative impacts	It is unlikely that other construction projects occur simultaneously with the construction works of the ANNA project. However, if this happens, the cumulative impact of the risk of social disruption may increase the project impact to a minor (-) significance.	

The potential impacts as a result of social disruption due to the presence of construction workers, are described below.

Table 6.48: Construction Impact: Social disruption as a result of construction workers

Phase	Construction
Impact description	The presence of construction workers (particularly non-local workers) may, intentionally or unintentionally, cause conflict with community members due to the differences in culture, beliefs, habits and rules of conduct between workers and local inhabitants. These could disrupt existing family structures and social networks due to a potential temporary increase in the level of petty crime, illicit activity, use of alcohol and drugs, and unplanned pregnancies.
Mitigation measures	• Promote awareness activities among workers regarding the culture, beliefs, habits and lifestyles of local communities, and define appropriate rules of conduct. The code of conduct should apply to both contractors and RNT staff and should set out the disciplinary and legal implications of certain activities involving local communities; • Implement awareness activities among local communities about the presence of non-local workers. Women from affected communities should be hired and trained to implement education and awareness raising activities. Materials can also be designed that can be replicated on other future projects. • Locate the workers accommodation in main villages/towns and not in the areas along the corridor to avoid interactions between workers and communities; • Avoid the positioning and placement of construction camps within close proximity to schools or locations where there is a permanent presence of young women and/or female children; and • Provide a Grievance Redress Mechanism for the handling of complaints/ requests, and for collecting information to assess the degree of interference

Phase	Construction	
	perceived by local communities and to consider the need for implementation of new measures. • A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances, and should be familiar with the local language and customs.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Short term**	**Immediate**
Extent	**Limited**	**Very limited**
Magnitude	**Extremely high**	**Very low**
Probability	**Probable**	**Unlikely**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Confidence	**Medium**	**Medium**
Reversibility	**High**	**High**
Resource irreplaceability	**Low**	**Low**
Comment on significance	Not applicable	
Cumulative impacts	It is unlikely that other construction projects occur simultaneously with the construction works of the ANNA project. However, if this happens, the cumulative impact of the risk of social disruption could increase the project impact to a minor (-) significance.	

The potential impact of discomfort experienced by communities as a result of the construction activities, is described below.

Table 6.49: Construction Impact: Discomfort due to construction activities

Phase	Construction	
Impact description	During the construction phase of the project, some activities may be a source of discomfort for people/social groups living in the immediate vicinity of the affected areas. The occurrence of such a situation (although limited to a restricted area) may create negative attitudes towards the contractors and the project: • The increase of large vehicles on the roads that are usually used in the transport of materials and equipment, may place pressure on the road network. On the main road network, this increase may be negligible. However, on the secondary network, where traffic is currently almost non-existent, the pressure will be felt significantly by the population that use and/or live in the immediate vicinity as these roads are also used for cattle transhumance); and • Some activities (such as clearing of vegetation, stripping of topsoil, use of various machinery and movement of vehicles for the transport of materials) could lead to the emission of dust and air pollutants and an increase in noise levels.	
Mitigation measures	• Apply mitigation measures as recommended for air quality and noise impacts; • Implement the SEP, with prior and extended communication of the planned activities (and timeline) and the access routes to be used during the project construction phase, to allow local communities to better understand the project and enable them to manage the discomfort in their daily lives; and • Provide a Grievance Redress Mechanism for the handling of complaints/ requests, and for gathering information to assess the degree of discomfort perceived by local communities and to consider the need for implementation of new measures. • A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances, and should be familiar with the local language and customs.	
Assessment	**Without mitigation**	**With mitigation**
Nature	**Negative**	**Negative**

Phase	Construction	
Duration	Short term	Immediate
Extent	Limited	Very limited
Magnitude	Low	Very low
Probability	Certain	Certain
Significance	MINOR (-)	NEGLIGIBLE (-)
Confidence	High	High
Reversibility	High	High
Resource irreplaceability	Low	Low
Comment on significance	Not applicable	
Cumulative impacts	It is unlikely that other construction projects occur simultaneously with the construction works of the ANNA project. However, if this happens, the cumulative impact of the discomfort from construction activities could increase the project impact to that of a minor (-) significance.	

The potential impacts on the communities, specifically in relation to gender-based violence (GBV), are described below. These somewhat overlap with the impacts already discussed, as they can be seen as cross-cutting.

Table 6.50: Construction Impact: Gender-based Violence

Phase	Construction
Impact description	The construction workforce will include non-local workers. In this regard, women and girls tend to constitute vulnerable groups and are susceptible to potential gender-based violence (GBV). GBV can be defined as (World Bank, 2018): • Physical violence (such as slapping, kicking, hitting, or the use of weapons); • Emotional abuse (such as systematic humiliation, controlling behavior, degrading treatment, insults, and threats); • Sexual violence, which includes any form of non-consensual sexual contact, including rape; • Early/forced marriage, which is the marriage of an individual against her or his will often occurring before the age of 18, also referred to as child marriage; • Economic abuse and the denial of resources, services, and opportunities (such as restricting access to financial, health, educational, or other resources with the purpose of controlling or subjugating a person); • Trafficking and abduction for exploitation; and, • Intimate Partner Violence (IPV) perpetrated by a former or current partner, includes a range of acts of violence. Major civil works can exacerbate GBV through the following (World Bank, 2018): • Projects with a large influx of workers may increase the demand for sex work - even increase the risk for trafficking of women for the purposes of sex work - or the risk of forced early marriage in a community where marriage to an employed man is seen as the best livelihood strategy for an adolescent girl. Furthermore, higher wages for workers in a community can lead to an increase in transactional sex. The risk of incidents of sex between laborers and minors, even when it is not transactional, can also increase. • Projects create changes in the communities in which they operate and can cause shifts in power dynamics between community members and within households. Male jealousy, a key driver of GBV, can be triggered by labour influx on a project when workers are believed to be interacting with community women. Hence, abusive behaviour can occur not only between project-related staff and those living in and around the project site, but also within the homes of those affected by the project.

	• When land redistribution occurs, for example due to resettlement for civil works, women may be extremely vulnerable to GBV. This is particularly true in countries where the legal systems preclude women from holding land titles. • Women and girls' job opportunities are limited due to a lack of appropriate transportation options. When creating job opportunities for women within projects, teams should be aware that traveling to and from work in some settings can force women and girls to use unsafe, poorly lit commuter routes, or unsafe public transport. Increased risk of violence is experienced when women are confronted with traveling long distances to access work opportunities or forced to travel at night.	
Mitigation measures	• Community awareness activities should include for GBV prevention and response, targeting both genders, as well as the Grievance Mechanism and relevant legal instruments in this regard. Awareness of trafficking to be included. • Skills audit to be managed independently to reduce chances of exploitation of women in terms of sexual favours to secure jobs. • Separate female CLO to ensure women are comfortable reporting GBV-related grievances. • Accommodation for non-local workers to be in nearby villages/towns and not near the corridor (and especially schools), to reduce contact with young girls and women. • Promote awareness activities among workers about the culture, beliefs, habits and lifestyles of local communities, and rules of conduct. The code of conduct should apply to both contractors and RNT staff and should include the disciplinary and legal implications of GBV. Each employee (including sub-contractors) shall sign the code of conduct. • Provide worker transport by bus between the site and accommodation to minimise traffic and limit workers remaining in the area after hours, as well as to ensure women workers do not have to travel after dark, for example. • Establish a process within the Grievance Mechanism specifically for the handling of GBV incidents/complaints that provide protection and support for the victim, so that no identifiable information on the victims is stored in the GM, and the victim is referred to service providers for support.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Short term**	**Short term**
Extent	**Municipal area**	**Municipal area**
Magnitude	**Moderate**	**Moderate**
Significance	**MINOR (-)**	**MINOR (-)**
Probability	**Likely**	**Probable**
Confidence	**Medium**	**Medium**
Reversibility	**Medium**	**Medium**
Resource irreplaceability	**Medium**	**Medium**
Comment on significance	None.	
Cumulative impacts	Impacts could be cumulative if there are other concurrent construction activities in the area of the corridor whereby additional non-local workers are present in the area. Assessed as **minor (-)**.	

The potential operational health and safety impacts on communities are described below.

Table 6.51: Operational Impact: Community health and safety

Phase	Operational
Impact description	During the operational phase, local communities may retain the perception of the risk associated with the possibility of a pylon or line falling and injuring or electrocuting someone. Such a perception of risk is common in communities that are unused to the presence of powerlines, as is the case in Angola.

Phase	Operational	
	Experience shows that this is unlikely to happen and, if a pylon or line should fall, the servitude does, to some extent, make provision for such events. However, this does not exclude the possibility of electrocution or accidents due to risk-taking behaviour by local communities (e.g. children climbing the pylons, theft of the steel pylon components, etc.). Behaviours of any staff or contractor related to the operation of the project may result in associated impacts such as unwanted and/or underage pregnancies, as well as the risk of spreading diseases. Similar mitigation measures therefore also apply during operation.	
Mitigation measures	• Publish a brochure in the local language for distribution in the local communities, that clearly defines the dangerous behaviour to be avoided, and provides correct and safe procedures to follow near the lines (to be included during awareness activities). Women from affected communities should be hired and trained to implement education and awareness raising activities. Materials can also be designed that can be replicated on other similar projects; • Erect warning signs in clearly visible locations at each pylon, stating "danger of death" in the local language and including an appropriate symbol for illiterate people, so that it may be understood by all; • Anti-climbing devices (as already included in the design) should be installed; • A code of conduct should be developed and communicated to any personnel (including contractors) working on the project that sets out disciplinary and legal implications of certain behaviours involving local communities; and • Monitor levels of electromagnetic fields.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Permanent**	**Immediate**
Extent	**Limited**	**Very limited**
Magnitude	**Extremely high**	**Negligible**
Probability	**Probable**	**Probable**
Significance	**MINOR (-)**	**MINOR (-)**
Confidence	**High**	**High**
Reversibility	**Medium**	**Medium**
Resource irreplaceability	**Low**	**Low**
Comment on significance	Not applicable	
Cumulative impacts	The presence of the Lubango substation may intensify the increased risk perceived by the communities, contributing to a minor (-) cumulative impact.	

The potential impacts associated with the exposure of the area to external factors, are described below.

Table 6.52: Operational Impact: Exposure of area to external influences

Project phase	Operational
Impact description	Increased accessibility as a result of the transmission line corridor may attract visitors from other geographical areas, in order to engage in illegal activities such as poaching, illegal logging, theft, etc. These illicit activities could have a negative influence on local communities by increasing pressure on natural resources, interfering with family structures and causing a collapse of law and order.
Mitigation measures	• Promote awareness-raising activities within local communities, concerning the increased accessibility and ways to prevent and/or address illicit activities. Women from affected communities should be hired and trained to implement education and awareness-raising activities. Materials can also be designed that can be replicated on other future projects; and • Provide a Grievance Redress Mechanism for the handling of complaints/ requests, and for collecting information that may prompt the need for implementation of new measures.

Project phase	Operational	
	• A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances, and should be familiar with the local language and customs.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Permanent**	**Permanent**
Extent	**Very limited**	**Very limited**
Magnitude	**Extremely high**	**Extremely high**
Probability	**Likely**	**Likely**
Significance	**MINOR (-)**	**MINOR (-)**
Confidence	**Medium**	**Medium**
Reversibility	**High**	**High**
Resource irreplaceability	**Low**	**Low**
Comment on significance	Not applicable	
Cumulative impacts	The presence of access roads to the project area, combined with development of main communication routes, will increase local accessibility. This impact could contribute to the attraction of more visitors intent on engaging in illegal activities thus contributing to a minor (-) cumulative impact.	

6.4.1.3 No-Go alternative

The No-Go alternative predicts the future scenario of the site, which would exist in the absence of the project. In this case, the characteristics of the socio-economic environment currently verified would be maintained, i.e. an area with a low population density, in which the local communities live in sparsely-located rural settlements, most without electricity and safe water for domestic needs. Livestock farming is the primary source of income, which is strongly dependent on pasture and water resources, making these communities extremely vulnerable to climatic extremes (e.g. drought) and food insecurity. In terms of poverty, the region is vulnerable, with more than half of the population considered as multi-dimensionally poor, and a significant percentage living in severe poverty.

On the other hand, the demand for electricity in the south of Angola will continue to grow at the current rate, but RNT will be without the means to meet this demand, with the obvious associated negative consequences that limited and unsafe electricity access has on the socio-economic development of communities.

Given the nature of the project, and its socio-economic benefits, the “No-Go” alternative is not considered desirable.

6.4.1.4 Summary

As the project supports and complements electricity production and distribution in the country, it plays a positive role in national development. This role is more evident in a country such as Angola, where a large part of rural communities does not have access to electricity (recognised as an essential condition for poverty reduction and improvement in the quality of life). Thus, the project will certainly play an important strategic role towards more equitable and sustainable development, but it is not free of impacts, especially in a study area where the communities are extremely dependent on the natural environment in which they live.

The assessment undertaken in this ESIA allows for a set of relevant conclusions to be drawn:

Negative impacts

- Prior to mitigation, the most significant negative impacts (moderate significance) will occur during the construction phase, which may extend to the operational phase of the project. These impacts are related to land and livelihoods, in the form of potential loss of shelter, livelihoods and natural resources. However, the project implementation conditions require that the alignment of the transmission line be carefully designed so as to avoid or minimise impacts on dwellings, associated structures and livelihoods, as far as possible. Where it is not possible to avoid physical and economic displacement, project implementation should demonstrate that both customary landowners and land users receive fair and adequate compensation for their losses.
- Other negative impacts are also predicted during the construction phase, related to increased risks to health (transmission of STDs, particularly HIV/AIDS, transmission of contagious diseases, such as tuberculosis, and contracting diseases caused by water contamination) and safety (traffic and work accidents), both for construction workers and for local communities. Negative impacts on the quality of life of the local communities were also predicted as a result of the discomfort and interference caused by construction activities in their daily lives. However, these negative impacts will be temporary (limited to the construction period) and of minor significance, even before mitigation measures are applied.
- During the operational phase, the negative impacts expected are related to the increased perception of danger by communities of the presence of the transmission line (risk of line or support falling and injuring or electrocuting someone) and the exposure of the corridor area to external influences. As for the perception of danger, experience shows that this is unlikely to occur and the servitude is established to cater for this and provide safe conditions. However, the possibility of accidents associated with risk-taking behavior by individuals and the community, is not excluded. In relation to the exposure to external influences, the maintenance access may also attract visitors from other regions who may engage in illicit activities (poaching, illegal logging, theft, among others). These negative impacts have the potential for successful mitigation through the application of a set of measures from the final design through to the construction phase. With the implementation of the proposed mitigation measures, the significance ratings of all impacts are reduced to acceptable levels, i.e. the impacts post-mitigation (residual impacts) are classified as having minor to negligible significance.

Positive impacts

- The positive impacts will be felt as soon as the demining activities commence (prior to construction and which will extend to the operational phase of the project) and major positive impacts on the safety of local communities are expected.
- The construction phase will also bring positive effects due to the economic benefits associated with job creation and increased opportunities for local sourcing of goods and services for construction.
- The primary benefits of the project will be felt in the operational phase, associated with the increase in the availability of electricity. Regional benefits will be expected, and for recipients of power, there will be significant benefits felt in their quality of life, as well as financially, contributing (directly or indirectly) to SDG 1, SDG 7 and SDG 13.

Considering the above conclusions, and the fact that the project is welcomed by local communities, from a socio-economic perspective the implementation of the project presents an advantage over the No-Go alternative, as long as the following requirements are met:

- An **inclusive and transparent involvement** of the communities in the decision-making process, regardless of their status, age or gender, thus maintaining the local population’s confidence in the project. Direct meetings/conversations are the preferred communication means to engage people and to convey information to all levels of understanding within the population. The convening of these meetings should be done directly with the local communal authorities and Sobas.
- **Due compensation for physical displacement, land losses and livelihood disruptions/losses, appropriate to the real needs of the communities**. Not necessarily related

to electricity, but of primary concern due to the scarcity of water (worsened by the current drought), construction of water infrastructure can constitute a significant compensation measure for communities (for supplying the communities and for livestock).

6.4.2 Archaeological and cultural heritage

6.4.2.1 Overview

The study was subject to limitations (as described in Section 5.4.2.3.3) and, as a result, the confidence level of some impacts is low, and this could influence the impact rating. Overall, very little of heritage significance was noted in the IAI along the areas that could be observed directly. The only significant heritage sites observed directly were a community and a "children's" graveyard close to Lubango, the *Pedra Vermelha Sagrada,* or Sacred Red Stone, close to Cahama, and a stone cistern built over a water pit in Cavalango (Figure 5.115). No other specific sites were identified or described, and the impacts stated here are based on sites that could most likely be encountered. It should also be noted that these impacts can, for the most part, be avoided through the execution of a pre-construction walk-down of the alignment, as recommended.

The possible sites that could be affected are grave and burial sites, archaeological sites, ceremonial sites or "places-of-power", paleontological sites and conflict sites. None of these were directly observed during the fieldwork. Some out-of-context pottery shards and isolated stone tools were observed. At the site of Calovango, the presence of natural surface water was most likely the trigger for long-term occupation and the reason why Stone Age tools were found there. However, no Stone Age sites were identified.

The potential exists for fossils and archaeological resources to be found in the study area, as well as culturally-sensitive sites such as graves, ceremonial sites, places-of-power for the local population, particularly to the San and Himba/Mudimba minority ethnic groups. Activities associated with the construction of the project could impact these heritage resources in the study area, namely directly from earthworks for the construction of the pylons and access roads, as well as indirectly from increased access to culturally-sensitive areas.

6.4.2.2 Potential impacts and mitigation

The potential impacts on graves and burial sites are described below.

Table 6.53: Construction Impact: Damage to graves and burial sites

Phase	Construction	
Impact description	Construction of the access road or specific pylon placements could physically damage burial and grave sites. Graves, especially within the Himba culture, are used to determine rights to land occupation and access. Relocation, where avoidable, is therefore not recommended. If relocation of people is required, graves should also be relocated, due to the strong spiritual link between the deceased and living family. Some graves in the study area have been identified by community members and need to be verified with field work.	
Mitigation measures	• Walk-down of final alignment to assist with the avoidance of graves, or exhumation and relocation, as part of the resettlement activities; • During the walkdown, the specialist must be accompanied by representative/s from the local communities to assist in the identification of heritage and cultural sites; Sobas and other elders must be involved, as they hold this knowledge; and • Implementation of the Grave Management Plan (as included in the ESMP - Volume III).	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Permanent**	**Short term**
Extent	**Limited**	**Limited**

Phase	Construction	
Magnitude	High	Low
Significance	MINOR (-)	NEGLIGIBLE (-)
Probability	Unlikely	Unlikely
Confidence	Medium	High
Reversibility	Low	High
Resource irreplaceability	High	Low
Comment on significance	Avoidance is the preferred mitigation, so as not to relocate graves, due to the cultural repercussion thereof.	
Cumulative impacts	Increased access, due to this development combined with the existence of large farms in both affected provinces, could increase access to burial areas that are currently isolated. This could increase the cumulative impact on such sites. A minor (-) impact is anticipated. However, this is based on a low certainty due to the conceptual nature of the project at this stage.	

The potential impacts on ceremonial sites and places-of-power are described below.

Table 6.54: Construction Impact: Damage to ceremonial sites and places-of-power

Phase	Construction	
Impact description	This impact can be direct or indirect. Where these sites consist of structures, the development can directly impact on them as a result of damage sustained. These sites are often defined by their privacy and, where access is enhanced by the development, it causes a secondary impact by removing this privacy.	
Mitigation measures	• As part of the social mitigation measures, these sites should be identified through the stakeholder engagement process and relocated. Certain deconsecration ceremonies may apply; and • Update the Heritage Management Plan where necessary (as included in the ESMP - Volume III).	
	Without mitigation	With mitigation
Nature	Negative	Negative
Duration	Short term	Brief
Extent	Limited	Very limited
Magnitude	Low	Negligible
Significance	NEGLIGIBLE (-)	NEGLIGIBLE (-)
Probability	Unlikely	Unlikely
Confidence	Medium	Medium
Reversibility	Medium	High
Resource irreplaceability	Low	Low
Comment on significance	None	
Cumulative impacts	Some ceremonial areas are associated with burial practices (as assessed in Table 6.53). There will be a cumulative impact where graves are also to be relocated and these sites then are no longer available for the required ceremonies. This impact could be increased when combined with the effects of other developments (such as mining or large farms) in the area. A minor negative impact is anticipated. However, this rating is based on a high level of uncertainty due to the project's current conceptual stage.	

The potential impacts from the excavation of Tertiary and Quaternary fossils, are described below.

Table 6.55: Construction Impact: Excavation of Tertiary and Quaternary fossils

Phase	Construction	
Impact description	If pylon foundations are to intrude deeper than 10 m (the upper ceiling of these fossiliferous deposits), it could unearth these materials.	
Mitigation measures	• A "chance finds protocol" for fossils should be followed – refer to the ESMP (Volume III); and • Update the Heritage Management Plan where necessary (as included in the ESMP - Volume III).	
	Without mitigation	With mitigation
Nature	Negative	Positive
Duration	Short term	Short term
Extent	Limited	Limited
Magnitude	Low	Low
Significance	NEGLIGIBLE (-)	NEGLIGIBLE (+)
Probability	Unlikely	Unlikely
Confidence	Medium	Medium
Reversibility	Low	High
Resource irreplaceability	Medium	Medium
Comment on significance	Due to the limited research on palaeontology in this area, the recovery of fossils will be beneficial to science, if done correctly.	
Cumulative impacts	Mining activities (prospecting) in the area may result in a cumulative increased impact, but would be accompanied by an expansion of knowledge. Both a minor (-), as well as a minor (+), impact is possible.	

The potential impacts on unidentified/sub-surface archaeological remains are described below.

Table 6.56: Construction Impact: Exposing unidentified/sub-surface archaeological remains

Phase	Construction	
Impact description	Archaeological deposits not identified during the fieldwork, or which are buried under the predominant and shifting alluvial sands, could be exposed during the construction activities and pylon foundation excavations. Such sites would offer no surface indication of their presence, due to the high state of alterations in some areas, as well as heavy vegetation cover in other areas. The following indicators of unmarked sub-surface sites could be encountered: • Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate); • Bone concentrations, either animal or human; • Ceramic fragments such as pottery shards, either historic or pre-contact; and • Stone concentrations of any formal nature.	
Mitigation measures	• Walk-down of final alignment and pylon placements; • Implement a "chance finds protocol" for sub-surface finds. Refer to the ESMP (Volume III); and • Update the Heritage Management Plan where necessary (as included in the ESMP - Volume III).	
	Without mitigation	With mitigation
Nature	Negative	Positive
Duration	Short term	Short term
Extent	Local	Local

Phase	Construction	
Magnitude	High	Very low
Significance	NEGLIGIBLE (-)	NEGLIGIBLE (+)
Probability	Unlikely	Unlikely
Confidence	Medium	Medium
Reversibility	Low	Medium
Resource irreplaceability	Medium	Medium
Comment on significance	Although information on archaeological sites are scant, there is a possibility of encountering Stone Age and Iron Age sites. Due to the low resolution of the fieldwork survey, this possibility is variable. Documentation of archaeological sites as a result of access to previously-inaccessible areas, will be beneficial for heritage research and archaeological knowledge within Angola.	
Cumulative impacts	The growth of the granite mining industry could negatively affect stone-walled sites (if they occur - none were identified during fieldwork), and the impact of construction activities for the powerline could compound this effect.	

The potential impacts on unidentified/sub-surface archaeological remains related to historic conflict sites, are described below.

Table 6.57: Operational Impact: Documentation of conflict sites within the proposed corridor

Phase	Operational	
Impact description	Due to the previous inaccessibility of some areas within the project corridor, there has been very little direct documentation of the conflict sites associated with the extended war in this area. Providing safe access to these areas, through demined access roads, could increase this knowledge an add to the historic documentations of the area and this era.	
Mitigation measures	Sites can be identified and documented during the walk-down survey of the final alignment.	
	Without mitigation	With mitigation
Nature	Negative	Negative
Duration	Short term	Short term
Extent	Local	Local
Magnitude	High	Very low
Significance	MODERATE (-)	MINOR (+)
Probability	Unlikely	Unlikely
Confidence	Medium	Medium
Reversibility	Low	Medium
Resource irreplaceability	Medium	Medium
Comment on significance	Significant contributions can be made to the documented history of the Angolan conflict from 1970 onwards.	
Cumulative impacts	Information gathered could lead to extended research on the conflict history of this area when combined with present research efforts focussed on archival information.	

6.4.2.3 No-Go alternative

The No-Go alternative will have the least impact on the heritage components discussed in this Report, especially with regard to the relocation of communities and their associated grave and burial sites, as well as spiritual sites. It is not expected that there will be any significant change in the impact (or lack thereof) with regard to palaeontological resources. Potential positive benefits due to access to areas for scientific research and documentation, might be lost.

6.4.2.4 Summary

All the impacts related to heritage would be incurred during the construction phase as a result of construction of the access road and pylon foundations. This includes damage to grave and burial sites, damage to ceremonial sites and places-of-power, excavation of Tertiary and Quaternary fossils, and encountering of unidentified or sub-surface archaeological remains. With mitigation, which includes the avoidance of spiritual sites (including graves), and the application of a “chance find protocol” for fossils and archaeological remains, the impact to such resources is rated as being of negligible negative significance. Fossil impacts are further assessed to have a potential negligible positive significance, as this would add to the scientific body of knowledge for this area. A pre-construction walk-down, once the detailed design is available, is imperative in order to identify areas to be avoided.

Analysis of the aerial imagery (satellite and LiDAR data) would have revealed the occurrence of any fatally flawed sites, such as megalithic Iron Age sites. None were identified. Large Stone Age deposits would not be readily visible on the LiDAR images. However, impacts on such deposits can be mitigated. Therefore, it can be assumed with a high degree of confidence, that no heritage fatal flaws are located within the study corridor.

Red flag issues are largely concerning grave and burial sites. Ideally, there should be no relocation of grave and burial sites due to the associated cultural impact this may cause.

Due to the limited physical coverage that was available during the field survey phase, combined with the lack of archival information, it is recommended that the final alignment and pylon placements be subjected to a heritage walk-down after detailed design, to determine if any unidentified sites will be affected. Final alteration can then be made to the design to mitigate any impacts on smaller sites. This should be done in coordination with the demining of the area, before any large-scale disturbance, namely the construction of access routes commences.

Interaction with the communities through the public participation and stakeholder engagement phases, can alleviate impacts on spiritual sites (including burial sites). Perceived sensitivity to these issues can improve the public image of the project. Management of any palaeontological finds can increase the net knowledge in this field of study and result in a positive impact. The same holds true for sites of historic conflicts, in particular the post-1970 military conflict. Previously these areas were found to be inaccessible due to the presence of unexploded ordnances (UXOs) and mines. The development of the powerline could supply safe access in this regard.

Lastly, access obtained through this development will enable future researchers to enter areas not previously safe, for furthering archaeological research. Due to the inaccessibility of the area as a result of land mines and other UXOs, there has been little to no heritage research undertaken. The development, and associated demining and opening of new access routes, will lead to research opportunities that were not available previously. This will result in a net positive impact.

It is important to note that, although unlikely, sub-surface remains of heritage sites could still be encountered during the construction of the project. Such sites would offer no surface indication of their presence due to the high state of alterations in some areas and the dense plant cover in other areas. A “chance find protocol” should be implemented, as stated in the ESMP (Vol. III).

6.4.3 Landscape and visual assessment

6.4.3.1 Assessment methodology

The construction phase could result in visual disturbance due to the constriction activities and presence of materials on site, whilst the presence of the industrial infrastructure during operation of the project could have an impact on both local resident communities (including indigenous settlements and homesteads) and sensitive receptors in the form of travellers and/or tourists, including those visiting the Bicuar National Park, Ruacana Falls or crossing the border into Angola.

The landscape and visual assessment methodology involved the following tasks:

- Analysis of the proposed development in terms of criteria such as visual intrusion, potential visibility, visual exposure, visual absorption capacity (VAC) and viewer sensitivity, to determine the magnitude of the impact. A 3D GIS terrain model was used to assess the visibility of the infrastructure;
- Emphasis was placed on potential visual receptors looking towards the proposed corridor. A desktop analysis was used to record relevant geographical locations within the vicinity of the corridor;
- Determination of the impact significance by synthesizing the assessment criteria as described above; and
- Recommendation of mitigation measures to reduce the potential negative impacts.

6.4.3.1.1 Potential visibility of the infrastructure

The viewshed of the project is the area from which the project will, theoretically, be visible. The viewshed is theoretical as it assumes a direct line of sight between any point within the viewshed and the object being viewed. However, the actual visibility will be less due to the screening of trees, local variations in topography, buildings and other infrastructure.

GIS has been used to generate the viewshed analyses for the proposed powerline corridor. The system has 3D topographical modelling capabilities, including a line-of-sight analysis. For this project, the viewshed analysis was generated by means of contours of the proposed alignment, using the maximum height of the proposed powerline (54.5 m), considering that the pylons would theoretically be spaced 500 m apart, and including a start and end point for the centre line (Figure 6.10).

The visibility of a development, and its influence on visual impact, is rated using the criteria listed in Table 6.58.

Table 6.58: Visibility rating

Visibility	Criteria	Rating
High	The development is visible from more than 50% of the zone of potential influence, views are unobstructed, and the majority of viewers are affected.	3
Moderate	The development is visible from less than 50% of the zone of potential influence.	2
Low	The development is visible from less than 25% of the zone of potential influence.	1

According to Hull and Bishop (1998), the visual exposure of the proposed project is based on the distance from the source of impact. The visibility of an object decreases exponentially over distance and, accordingly, visual impact will diminish as the viewer moves away from the object being viewed. Table 6.59 provides the rating for the visual exposure.

Table 6.59: Visual exposure

Visual exposure	Criteria	Rating
High	0 -750 km (Dominant or clearly visible)	3
Moderate	750 – 1.5 km (Recognizable to the viewer)	2
Low	>1.5 km (Not particularly noticeable to the viewer)	1

The line crosses the Lubango-Cahama-Ondjiva road three times and runs parallel to this main road for approximately 26 km.

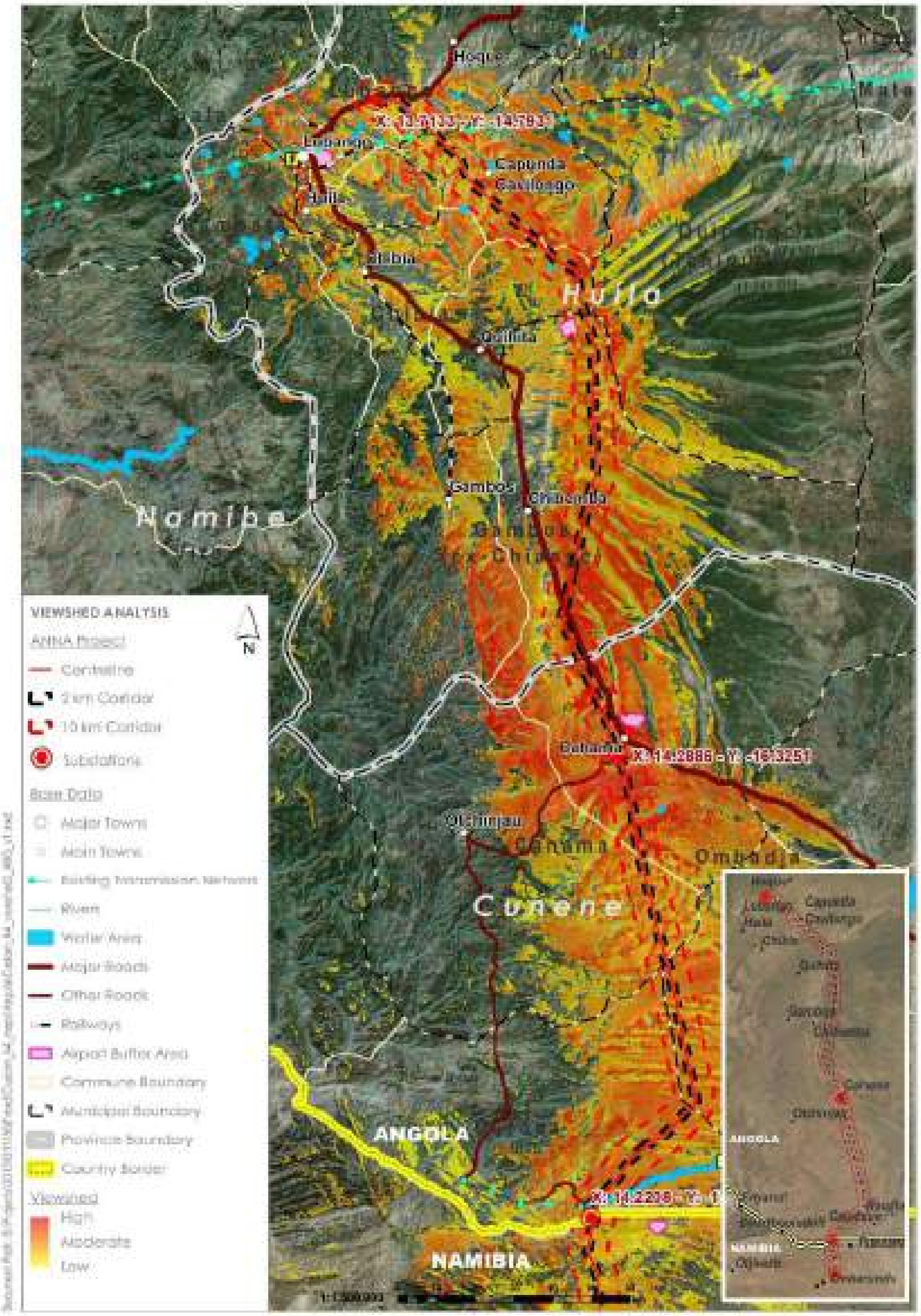

Figure 6.10: Viewshed of the transmission line

The degree of visual intrusion is related to the idea of context and maintaining the integrity of the landscape, and essentially rates the degree of contrast between the appearance of the proposed development and the existing environment. The higher the landscape quality and the more consistent the visual context, the more likely the impact will be intrusive. Visual intrusion is rated according to Table 6.60.

Table 6.60: Visual intrusion rating

Visual intrusion	Criteria	Rating
High	Results in a noticeable change or is discordant with the landscape	3
Moderate	Partially fits into the landscape, but clearly noticeable	2
Low	Minimal change or blends in well with the landscape	1

There are no other transmission lines of this scale within the corridor area (except for a small portion of an existing transmission line running across the proposed line route, in an east-west direction at a point approximately 20 km from Lubango substation). There is a possibility that smaller electric lines and telephone poles could be visible in larger settlement towns such as Cahama and along the main road of Lubango-Cahama-Ondjiva. The visual intrusion of the proposed infrastructure is considered to be moderate to high.

The legend on the viewshed map in this section should be interpreted as follows:

- Yellow (i.e. low visual magnitude/intensity) means that at least one tower is visible from one place at the furthest extent of the viewshed;
- Orange (i.e. moderate visual magnitude/intensity) means that approximately 6 to 8 towers are visible from one place at the furthest extent of the viewshed; and
- Red (i.e. high visual magnitude/intensity) means that at least 15 towers are visible from one place at the furthest extent of the viewshed.

6.4.3.1.2 Visual impact magnitude

Magnitude = [Landscape quality x (visibility/visual exposure combined rating + visual intrusion + VAC] x viewer sensitivity. From this formula, the maximum magnitude score is 81. The possible range of magnitude scores is categorised as shown in the table below. For the purpose of the significance assessment, and to align with the impact criteria and rating scale, the various categories are re-scored as indicated in Table 6.61.

Table 6.61: Re-scored visual impact magnitude

Magnitude score	Re-scored to align with impact criteria and rating scale	
79 - 81	7	Extremely high
75 - 78	6	Very high
66 - 74	5	High
56 - 65	4	Moderate
35 - 55	3	Low
15 - 34	2	Very low
1 - 14	1	Negligible

Table 6.62 indicates the estimated magnitude per individual impact, considering the abovementioned criteria.

Table 6.62: Estimated magnitude per individual impact

Impact	Impact assessment parameter	Rating	Description
Construction phase			
Visual impact as a result of demining activities	Visibility (viewshed analysis) AND visual exposure (how far is the activity from viewers)	2	Demining activities will take place within the DAI
	Visual intrusion (how the project fits within the environment)	3	Deming will mostly occur in natural areas that have abundant vegetation cover
	Intensity/Magnitude before mitigation	3	Low

Impact	Impact assessment parameter	Rating	Description
Visual impact as a result of general construction activities on road users, people travelling to the region and on permanent residents	Visibility (viewshed analysis) AND visual exposure (how far is the activity from viewers)	2	Construction camps and related infrastructure will probably be located within the DAI
	Visual intrusion (how the project fits within the environment)	3	There is no similar or existing construction equipment evident in the area
	Intensity/Magnitude [before mitigation	3	Low
Operational phase			
Visual impact on informal dispersed settlements and on subsistence farmers	Visibility (viewshed analysis) AND visual exposure (how far is the activity from viewers)	2	Most informal dispersed settlements are located in less than 50% of the zone of potential influence
	Visual intrusion (how the project fits within the environment)	2.5	No other similar infrastructure is present and dispersed settlements and natural landscape dominate
	Intensity/Magnitude before mitigation	2	Very low
Visual impact on main road: Lubango-Cahama-Ondjiva	Visibility (viewshed analysis) AND visual exposure (how far is the activity from viewers)	3	Refer to viewshed map
	Visual intrusion (how the project fits within the environment)	2	Except for the road, little to no large infrastructure is present along the particular stretch of the proposed alignment where it runs parallel to the EN195. The natural landscape dominates.
	Intensity/Magnitude before mitigation	3	Low
Visual impact on Bicuar National Park	Visibility (viewshed analysis) AND visual exposure (how far is the activity from viewers)	1	Refer to viewshed map
	Visual intrusion (how the project fits within the environment)	3	Corridor is in close proximity of protected area (views from protected area)
	Intensity/Magnitude before mitigation	4	Moderate
Visual impact of the transmission line on Cahama and Kapunda Kavilongo	Visibility (viewshed analysis) AND visual exposure (how far is the activity from viewers)	3	Refer to viewshed map
	Visual intrusion (how the project fits within the environment)	1.5	Formal settlements, various other man-made infrastructure present, but not of this nature
	Intensity/Magnitude before mitigation	1	Negligible
Visual impact as a result of the presence of the proposed Cahama substation	Visibility (viewshed analysis) AND visual exposure (how far is the activity from viewers)	2	Refer to viewshed map
	Visual intrusion (how the project fits within the environment)	2.5	No other similar infrastructure is present and dispersed settlements and natural landscape dominate
	Intensity/Magnitude before mitigation	2	Very low
Visual impacts on receptors travelling to the border post or Ruacana Falls	Visibility (viewshed analysis) AND visual exposure (how far is the activity from viewers)	1	Refer to viewshed (as a result of the natural valley, the viewer will be much lower than the proposed alignment)
	Visual intrusion (how the project fits within the environment)	2.5	There is a dam wall and vehicular bridge present, but no other similar infrastructure. Some dispersed formal buildings, related to the border post, but no other similar infrastructure. Natural landscape dominates.

Impact	Impact assessment parameter	Rating	Description
	Intensity/Magnitude before mitigation	4	Moderate

6.4.3.2 Potential impacts and mitigation

6.4.3.2.1 Landscape and visual impacts during construction

The potential landscape and visual impacts during construction are described below.

Table 6.63: Construction Impact: Visual impacts due to demining operations

Phase	Construction	
Impact description	Demining is the process of removing land mines from an area, and the process usually involves mechanical excavation or disturbance of a certain area. Demining will mostly occur in natural areas that have abundant vegetation cover.	
Mitigation measures	Hydroseeding of affected areas with an indigenous grass mix and the replanting of trees and shrubs in disturbed areas – case by case site evaluation must be undertaken.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Short term**	**Short term**
Extent	**Limited**	**Limited**
Magnitude	**Low**	**Very low**
Significance	**MINOR (-)**	**NEGLIGIBLE (-)**
Probability	**Almost certain / highly probable**	**Almost certain / highly probable**
Confidence	**High**	**High**
Reversibility	**Medium**	**High**
Resource irreplaceability	**Medium**	**Low**
Comment on significance	The proposed mitigation measures will not lower the significance, but will lower the overall impact intensity.	
Cumulative impacts	None expected	

Table 6.64: Construction Impact: Visual impacts from construction works

Phase	Construction
Impact description	Visual impact as a result of general construction activities on road users, people travelling to the region and on permanent residents. The potential visual impacts of construction camps and laydown areas relates to the clearing of vegetation, and the foreign intrusion of structures both in terms of scale and aesthetics, as well as security and stockpiled materials. Construction camps and related infrastructure will most likely be located within the DAI. There is no similar or existing construction equipment evident in the area.
Mitigation measures	• Locate construction camps outside of sensitive areas such as rural settlements, public gathering areas, schools and towns; • Do not locate camp sites in areas where it will be necessary to remove trees and shrubs or large areas of well-established vegetation. Where possible, make use of sites that have previously been disturbed; • Only the larger tree species and/or individuals potentially causing problems with the transmission line, should be removed (refer to Section 6.3.1); • Make use of existing access roads to minimise modification of the existing topography and the removal of large trees. Roads/routes should wind around natural features, mature shrubs and shrub thickets.

Phase	Construction	
	• Vegetation clearance along the construction footprint of the servitude must be minimised by demarcating the work area and restricting vehicular access outside the area (i.e. clearly designated no-go area outside of the active work area); • Material stockpiles should not be higher than 3 m; • Signage should not be obtrusive and should not be seen against the skyline; • The security lighting around the contractor's camp must be kept as dim as possible; • Upwards light spill must be minimised by "blinkers" designed to ensure light is directed downwards whilst preventing side spill; and • Temporary areas, cleared during construction, must be rehabilitated in accordance with recommendations in the ecological specialist report.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Short term**	**Short term**
Extent	**Limited**	**Limited**
Magnitude	**Very low**	**Very low**
Significance	**MINOR (-)**	**MINOR (-)**
Probability	**Almost certain / highly probable**	**Almost certain / highly probable**
Confidence	**High**	**High**
Reversibility	**Medium**	**High**
Resource irreplaceability	**Medium**	**Low**
Comment on significance	The proposed mitigation measures will not lower the significance, but will lower the overall impact intensity.	
Cumulative impacts	None expected	

6.4.3.2.2 Visual impacts during operation

The potential landscape and visual impacts during operation, are described below.

Table 6.65: Operational Impact: Visual impacts on rural settlements

Phase	Operational	
Impact description	Visual impact on informal dispersed settlements and on subsistence farmers. No other similar infrastructure present and dispersed settlements and natural landscape dominate the area. The potential visual impact of the transmission line relates to its maximum height of up to 54.5 m, and to the metallic industrial aesthetic that contrasts with the typically flat and natural character of the study area.	
Mitigation measures	• Due to the visually-intrusive design, pylon structure types YAS and YAL should only be used due to technical requirements; • If possible, pylons should be located where the landscape forms a natural valley, to maximise on the potential of the topography to form a natural screen. Advantage should be taken of existing vertical features such as rows of tall trees to serve as a backdrop or as a screen for the transmission line; and • Vegetation clearance along the servitude must be minimised.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Short term**	**Short term**
Extent	**Limited**	**Limited**

Phase	Operational	
Magnitude	Very low	Very low
Significance	MINOR (-)	MINOR (-)
Probability	Almost certain / highly probable	Almost certain / highly probable
Confidence	High	High
Reversibility	Medium	High
Resource irreplaceability	Medium	Low
Comment on significance	The proposed mitigation measures will not lower the significance, but will lower the overall impact intensity.	
Cumulative impacts	None expected	

Table 6.66: Operational Impact: Visual impacts on main access roads

Phase	Operational	
Impact description	Visual impact on the main access road Lubango-Cahama-Ondjiva. Except for this road, little to no big infrastructure is present along the particular stretch against which the proposed alignment runs parallel. The natural landscape is dominant. The potential visual impact of the transmission line relates to its maximum height, of up to 54.5 m, as well as the metallic industrial aesthetic that contrasts with the typically flat and natural character of the study area.	
Mitigation measures	The same mitigation measures as in Table 6.65 applies.	
	Without mitigation	With mitigation
Nature	Negative	Negative
Duration	Short term	Short term
Extent	Limited	Limited
Magnitude	Very low	Very low
Significance	MINOR (-)	MINOR (-)
Probability	Almost certain / highly probable	Almost certain / highly probable
Confidence	High	High
Reversibility	Medium	High
Resource irreplaceability	Medium	Low
Comment on significance	The proposed mitigation measures will not lower the significance, but will lower the overall impact intensity. The cumulative impacts (as indicated below) will not affect the overall significance rating.	
Cumulative impacts	Future 60 kV and 220 kV transmission lines, crossing the proposed 440 kV transmission line, will contribute to the cumulative visual impact.	

Table 6.67: Operational Impact: Visual impact on the Bicuar National Park

Phase	Operational	
Impact description	Visual impact as a result of the 400 kV transmission line on the Bicuar National Park, as the corridor passes in close proximity to this protected area. The natural landscape is dominant. The potential visual impact of the transmission line relates to its maximum height of up to 54.5 m, and the metallic industrial aesthetic that contrasts with the typically flat and natural character of the study area.	
Mitigation measures	The same mitigation measures as in Table 6.65 applies.	
	Without mitigation	With mitigation

Phase	Operational	
Nature	Negative	Negative
Duration	Short term	Short term
Extent	Limited	Limited
Magnitude	Very low	Very low
Significance	MINOR (-)	MINOR (-)
Probability	Almost certain / highly probable	Almost certain / highly probable
Confidence	High	High
Reversibility	Medium	High
Resource irreplaceability	Medium	Low
Comment on significance	The proposed mitigation measures will not lower the significance, but will lower the overall impact intensity. The cumulative impacts (as indicated below) will not affect the overall significance rating.	
Cumulative impacts	Future 60 kV and 220 kV transmission lines, crossing the proposed 440 kV transmission line, will contribute to cumulative visual impacts. However, the fact that all this infrastructure will be localised outside of the National Park, and far away from the main access, makes this cumulative impact negligible (-).	

Table 6.68: Operational Impact: Visual impact on Cahama and Kapunda Kavilongo settlements

Phase	Operational	
Impact description	Visual impact of the transmission line on Cahama and Kapunda Kavilongo formal settlements. Various other man-made infrastructure is present, but not of this nature. The potential visual impact of the transmission line relates to its maximum height of up to 54.5 m, and its metallic industrial aesthetic that contrasts with the typically flat and natural character of the study area.	
Mitigation measures	Mitigation measures as in Table 6.65 apply.	
	Without mitigation	With mitigation
Nature	Negative	Negative
Duration	Short term	Short term
Extent	Limited	Limited
Magnitude	Very low	Very low
Significance	MINOR (-)	MINOR (-)
Probability	Almost certain / highly probable	Almost certain / highly probable
Confidence	High	High
Reversibility	Medium	High
Resource irreplaceability	Medium	Low
Comment on significance	The proposed mitigation measures will not lower the significance, but will lower the overall impact intensity. The cumulative impacts, as indicated below, will not affect the overall significance rating.	
Cumulative impacts	Future 60 kV and 220 kV transmission lines, crossing the proposed 440 kV transmission line, will contribute to the cumulative visual impact.	

Table 6.69: Operational Impact: Visual impact as a result of the Cahama substation

Phase	Operational
Impact description	Visual impact, as a result of the presence of the proposed Cahama substation, on nearby settlements (Cahama village is close). Various other man-made infrastructure is present, but not of this nature.

Phase	Operational	
	The potential visual impacts of the substation relate to the foreign nature of the intrusion, in terms of scale, lighting and the aesthetics of the structure. The potential visual impacts of the substation relate to its security lighting.	
Mitigation measures	• If there are any cut-and-shape embankments, these should be rounded at the edges, giving it a more natural appearance (if space permits); • Establish tree lanes in strategic places along the substation boundary line, so the planting acts as screening in order to visually fragment extensive views of the substation; and • The security lighting around the substation fence must be kept as dim as possible. Lighting should only be activated when triggered, and should not remain on throughout the night. Upward light spill must be minimised by "blinkers" designed to ensure that light is directed downwards, whilst preventing sideways spill.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Short term**	**Short term**
Extent	**Limited**	**Limited**
Magnitude	**Very low**	**Very low**
Significance	**MINOR (-)**	**MINOR (-)**
Probability	**Almost certain / highly probable**	**Almost certain / highly probable**
Confidence	**High**	**High**
Reversibility	**Medium**	**High**
Resource irreplaceability	**Medium**	**Low**
Comment on significance	The proposed mitigation measures will not lower the significance, but will lower the overall impact intensity. The cumulative impacts (as indicated below) will not affect the overall significance rating.	
Cumulative impacts	Future 60 kV and 220 kV transmission lines, crossing the proposed 440 kV transmission line, will contribute to the cumulative visual impact.	

Table 6.70: Operational Impact: Visual impacts on receptors travelling to the border post or Ruacana Falls

Phase	Operational	
Impact description	The potential visual impact of the transmission line relates to its maximum height of up to 54.5 m, and its metallic, industrial aesthetic that contrasts with the overall natural character of the study area. It is anticipated that there will be a visual impact experienced by people visiting the Ruacana Falls or travelling to/from the border post. As a result of the natural valley, the viewer will be much lower than the proposed corridor. Even though the natural landscape still dominates, some dispersed formal buildings related to the border post are present, but no similar infrastructure is present.	
Mitigation measures	Mitigation measures presented in Table 6.65 apply.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Permanent**	**Permanent**
Extent	**Limited**	**Limited**
Magnitude	**Very low**	**Negligible**
Significance	**MINOR (-)**	**MINOR (-)**
Probability	**Likely**	**Likely**
Confidence	**Low**	**Low**

Phase	Operational	
Reversibility	**Medium**	**Medium**
Resource irreplaceability	**Medium**	**Medium**
Comment on significance	The proposed mitigation measures will not lower the significance, but will lower the overall impact intensity.	
Cumulative impacts	The proposed project will increase the cumulative visual impact as there are similar infrastructure elements visible within the study area. This is rated as being of minor (-) significance.	

6.4.3.3 No-Go scenario

In this scenario the study area remains unaltered. The "No-Go" alternative has a neutral impact compared to the project alternative, as the existing environment will not be visually altered as a direct result of the proposed project.

6.4.3.4 Summary

The construction and operation of the proposed 400 kV transmission line will result in visual impacts within the study area, and the project components and activities will change the existing features or qualities of the visual resource. The transmission line will constitute a change to the overall sense of place and character of the landscape, as it introduces new features that are out of character with the existing situation. Theoretically, the predicted visual impact (based on the Guideline for Involving Visual and Aesthetic Specialists on Environmental Impact Assessment (EIA) processes (Oberholzer, 2005)) is high. However, after assessing the nature of the development and the sensitivity of the existing environment, it can be regarded as negative (minor) in most areas, due to:

- The scale of the structures and the high visibility based on the flat topography and low vegetation height, relative to the proposed infrastructure;
- The low receptor concentration (small dispersed rural settlements and large expanses of sparsely-inhabited territory) throughout the study area, and vilages such as Cahama and Capunda Cavilongo have a low population density;
- The propose alignment traverses the main road four times over a span of 331 km;
- The viewshed analysis shows that sensitive receptor locations such as the Bicuar National Park and the Ruacana Falls, will have low visibility as a result of the distance (proposed alignment is more than 10 km away from bigger main roads within the park) and the natural valley topography (people viewing the Ruacana Falls will be much lower than the proposed infrastructure); and
- The visual quality is high in most parts of the study area, even though the study area does not fall within any protected area, major tourist destination or national heritage site.

The proposed mitigation measures will need to be evaluated on a site-specific scale and, through successful implementation of the towers, receptors may perceive the proposed infrastructure as a sign of progress after the civil war. The completed transmission line will result in a significant visual change in the existing environment, but the anticipated visual impacts are not considered fatal flaws or red flags from a landscape perspective, as the proposed alignment does not traverse any visually-sensitive areas such as national parks or areas with high heritage status.

6.4.4 Hazardous and non-hazardous waste management

6.4.4.1 Overview

This section aims to assess the potential impacts of the proposed development as a result of waste generation. Construction will generate a significant level of waste from various waste streams. These are from the presence of construction workers (domestic waste and sewage), the generation of rubble and spoil from earthworks, as well as the use of hazardous chemicals and by-products thereof, such as fuel and concrete/cement. As for the operational phase the waste generation is related with the maintenance of the electric line and substations equipment.

6.4.4.2 Potential impacts and mitigation

The potential impacts of waste generation during construction are described below.

Table 6.71: Construction Impact: Generation of waste

Phase	Construction	
Impact description	Construction activities will result in the generation of a number of different waste streams, including domestic waste, rubble and hazardous waste. In addition to the generation of waste being an impact, waste has a number of potential indirect impacts if not managed correctly, such as unpleasant odours, aesthetic impacts, health and safety impacts, soil, ground and surface water contamination.	
Mitigation measures	A Waste Management Plan is included in the ESMP (Volume III) which recommends mitigation measures to manage the different waste streams in accordance with the waste management hierarchy (avoid, reuse, recycle, and reprocess and dispose) including the following actions: • Waste generated in the construction site must be segregated into different categories to facilitate their reuse, recycling or disposal. Separate hazardous and non-hazardous waste streams. • All work area must have a sufficient number of colour coded / labelled waste bins to deal with hazardous, non-hazardous and food waste. Waste bins should have lids and must be emptied at daily intervals, or as needed. • Conduct regular inspections of waste storage areas to check for problems, littering, over filling (e.g collection schedule unadjusted), spillages, etc. and address them accordingly. • Ensure that oily wastewater is treated in an oil separator and pond before being discharged to the environment. • Ensure that emergency spill kits are present at strategic locations with capable people with the necessary training available to use it in case of accidental spillages. Any spill incidents must be cleaned up immediately and in according with the emergency procedure stated in the Contingency Plan that forms part of the Hazardous Materials Management Plan (included in the ESMP – Vol. III) • If the adjacent communities don't wish to make use of the vegetation cut from bush clearing activities, this residue must be disposed of in a manner that it does not pose a fire risk to the infrastructure and in accordance with any RNT policies on bush clearing that become available. • Whenever possible and feasible re-use inert construction waste (such as excavated subsoil and building rubble) as backfilling. • No solid waste may be burned or buried on site or disposed of by any other method on site. Solid waste must be disposed via the formal waste management facilities and systems in the region. • All batteries must be disposed at a registered landfill site. • All hazardous waste transporters have to be appropriately licensed.	
	Without mitigation	**With mitigation**
Nature	**Negative**	**Negative**
Duration	**Permanent**	**Permanent**
Extent	**Limited**	**Limited**
Magnitude	**Very low**	**Very low**
Significance	**MINOR (-)**	**MINOR (-)**
Probability	**Almost certain / highly probable**	**Almost certain / highly probable**
Confidence	**Medium**	**Medium**
Reversibility	**Medium**	**Medium**

Phase	Construction	
Resource irreplaceability	Medium	Medium
Comment on significance	The potential for effective mitigation is high when the waste management hierarchy is applied.	
Cumulative impacts	Cumulative impacts from the generation of waste are difficult to predict as it is the responsibility of each utility, and is dependent on local context and available waste management facilities. Most areas in the region are rural, and it is doubtful whether developments in more remote areas will be able to apply the hierarchy effectively. The overall impact of waste generation in the region, from other proposed projects, is considered to be of minor (-) significance.	

Table 6.72: Operational Impact: Generation of waste

Phase	Construction	
Impact description	Operational activities will result in the generation of a number of different waste streams, mainly oils, lubricants, paints (hazardous waste) and vegetation from bush clearing, associated with the maintenance activities.	
Mitigation measures	The Waste Management Plan included in the ESMP (Volume III) must be respected including the following actions: • The waste generated must be segregated into different categories to facilitate their reuse, recycling or disposal. Separate hazardous and non-hazardous waste streams. • Conduct regular inspections of waste storage areas to check for problems, littering, over filling (e.g collection schedule unadjusted), spillages, etc. and address them accordingly. • Ensure that emergency spill kits are present at strategic locations with capable people with the necessary training available to use it in case of accidental spillages. Any spill incidents must be cleaned up immediately and in according with the emergency procedure stated in the Contingency Plan that forms part of the Hazardous Materials Management Plan (included in the ESMP – Vol. III) • If the adjacent communities don't wish to make use of the vegetation cut from bush clearing activities, this residue must be disposed of in a manner that it does not pose a fire risk to the infrastructure and in accordance with any RNT policies on bush clearing that become available. • No solid waste may be burned or buried on site or disposed of by any other method on site. Solid waste must be disposed via the formal waste management facilities and systems in the region. • All batteries must be disposed at a registered municipal landfill site. • All hazardous waste transporters have to be appropriately licensed.	
	Without mitigation	With mitigation
Nature	Negative	Negative
Duration	Permanent	Permanent
Extent	Limited	Limited
Magnitude	Very low	Very low
Significance	MINOR (-)	MINOR (-)
Probability	Almost certain / highly probable	Almost certain / highly probable
Confidence	Medium	Medium
Reversibility	Medium	Medium
Resource irreplaceability	Medium	Medium
Comment on significance	The potential for effective mitigation is high when the waste management hierarchy is applied.	
Cumulative impacts	Cumulative impacts from the generation of waste are difficult to predict as it is the responsibility of each utility, and is dependent on local context and available waste management facilities. Most areas in the region are rural, and it is doubtful whether	

Phase	Construction
	developments in more remote areas will be able to apply the hierarchy effectively. The overall impact of waste generation in the region, from other proposed projects, is considered to be of minor (-) significance.

6.4.4.3 No-Go alternative

The No-Go alternative will allow the status quo to prevail, and the impact is considered neutral as the magnitude would be zero, meaning that natural and/or social functions and/or processes remain unaltered. Due to the rural and isolated nature of most of the corridor, generated waste, and its associated effects, are limited, and would remain this way.

6.4.4.4 Summary

The generation of waste and its associated effects is rated as having an impact of minor negative significance, as waste that is generated will constitute a long-term impact, although very localised to certain parts of the corridor. Throughout the projects lifecycle it can be mitigated through the application of the waste mitigation hierarchy, as detailed in the waste management plan included in the ESMP (Volume III).

7 Environmental and social management of the project

As an essential part of this ESIA Report, an Environmental and Social Management Plan (ESMP) is included as Volume III of the documentation set. This ESMP addresses the entire life of the project, from the planning phase to its decommissioning. This ESMP includes a set of general and specific recommendations that establish the basis for mitigation, management and environmental monitoring of the potential impacts identified during the different phases of project implementation, and sets out how the project will mobilise resources to implement these measures. The ESMP has the following key objectives:

- Ensure compliance with relevant national legislation and international regulations, environmental good practice and commitments made in the ESIA Report;
- Communicate key environmental and social expectations and requirements to all role-players;
- Carry over and set out the measures identified in the ESIA report to mitigate key environmental and social impacts during the construction and operational phases of the project;
- Establish systems to identify and prevent adverse environmental, social and economic impacts that might arise from the project;
- Set out the roles and responsibilities for key role-players responsible for the implementation of the ESMP;
- Set out the monitoring requirements for the various phases of the project; and
- Ensure that there is adequate allocation of resources on the project to implement the ESMP-related activities.

In order to fulfil these objectives, the ESMP is structured as follows:

- Section 1: Introduction – sets out the purpose of the ESMP and the objectives of the document, as well as the structure of the document.
- Section 2: Project summary – describes the ANNA Transmission Interconnector Project, its components and the proposed activities throughout its lifecycle.
- Section 3: Legislation and policy framework – lists the relevant national legislation, as well as the SAPP policies and the international framework for compliance, namely the IFC and DBSA requirements. It describes the relevance for the project and where in this document these provisions are included.
- Section 4: Roles and responsibilities - sets out the roles and responsibilities of the different parties involved in the execution of the project.
- Section 5: Environmental and social management – provides the approach of the environmental and social management and provides detailed plans to address each of the aspects and impacts identified as requiring mitigation measures.
- Section 6: Training and environmental awareness – describes the proposed training for various parties to ensure that they are equipped to execute the ESMP, based on their roles, as well as proposed training for communities to raise awareness regarding project activities.
- Section 7: Emergency preparedness and response – includes a framework plan for identifying risks and procedures so that the relevant parties are prepared in their response.
- Section 8: Grievance Mechanism – describes the proposed Grievance Mechanism to be implemented for the project lifecycle.
- Section 9: Schedule and budget for ESMP implementation - includes the estimated capital and recurrent costs to implement the ESMP and all the additional activities identified within the current ESIA report, such as net positive contribution initiatives.
- Section 10: ESMP reporting, monitoring and auditing – provides the process for regular monitoring, audit and review of the ESMP for performance improvements where relevant.

8 Conclusions and final recommendations

8.1 Summary of the project

The project involves the development of a 400 kV overhead transmission line, with a total length of approximately 362 km from the proposed Lubango substation in Angola, to the proposed Kunene substation in Namibia, 331 km of which falls within Angola and is the subject of this ESIA process. The project is currently in the conceptual design phase and detailed design is not yet available. The ESIA Report (this document) assesses a 2 km wide corridor for this length (1 km on either side of the centreline of the proposed line), referred to as 'the study area'. The transmission line servitude of approximately 55 m wide, will be located within this 2 km wide corridor. A 12 m wide strip, and a footprint of approximately 20 m x 20 m around each pylon, will be cleared of trees and obstacles. Existing access roads will be used where practicable, and further access and inspection roads will be created within the servitude where required. These will be mostly single dirt tracks, mostly directly below the transmission line.

8.2 Summary of potential impacts

The potential impacts expected to arise from the proposed project are summarised below in Table 8.1. Should the mitigation measures provided in the tables in Section 6 and detailed in the ESMP (Volume III) be implemented, post-mitigation impact ratings are assessed to range from negligible, minor and moderate negative significance, to a number of positive impacts, mostly socio-economic, of negligible, minor, moderate and major significance. The negative impacts of highest significance after mitigation, are associated with climate change (construction and operation) and avifaunal mortalities during the operational phase, and are all classified as being of moderate significance. The positive impacts of highest significance after enhancement, are improved safety as a result of demining operations, as well as increased availability of electricity (both with major significance).

Table 8.1: Summary of potential impacts

Environmental aspect	Impact	Pre-mitigation	Post-mitigation
Construction			
Physical Environment			
Climate change	Increased GHG emissions	Moderate (-)	Moderate (-)
	Increased temperatures on personnel	Minor (-)	Negligible (-)
Geology and geomorphology	Potential loss/change of geological resources	Minor (-)	Negligible (-)
	Chemical contamination of geological formations	Minor (-)	Negligible (-)
Water Resources	Groundwater contamination	Minor (-)	Negligible (-)
	Quantitative impacts on groundwater resources	Minor (-)	Negligible (-)
	Surface water resources	Minor (-)	Negligible (-)
Soils and land use capability	Soil erosion and topsoil loss	Minor (-)	Negligible (-)
	Soil contamination	Minor (-)	Negligible (-)
	Changes to land use	Minor (-)	Negligible (-)
Air Quality	Air quality impact	Minor (-)	Negligible (-)
Ambient Noise	Noise emissions	Minor (-)	Negligible (-)
Biotic Environment			
Terrestrial ecology	Disturbance or loss of flora	Minor (-)	Negligible (-)
	Disturbance or loss of fauna	Negligible (-)	Negligible (-)
	Sensitive habitats	Major (-)	Negligible (-)
Avifauna	Disturbance of avifaunal habitat	Minor (-)	Negligible (-)
Ecosystem services	Ecosystem services	Moderate (-)	Negligible (-)
Socio-economic Environment			

Environmental aspect	Impact	Pre-mitigation	Post-mitigation
Demographic and socio-economic aspects	Job creation	Moderate (+)	Moderate (+)
	Sourcing of local goods and services	Minor (+)	Minor (+)
	Physical displacement	Major (-)	Minor (-)
	Economic displacement – loss of livelihoods	Major (-)	Minor (-)
	Economic displacement – loss of natural resources	Moderate (-)	Minor (-)
	Improved safety from demining operations	Major (+)	Major (+)
	Increased risk of contracting diseases	Minor (-)	Negligible (-)
	Site health and safety	Minor (-)	Negligible (-)
	Social disruption from construction workers	Minor (-)	Negligible (-)
	Discomfort from construction activities	Minor (-)	Negligible (-)
	Gender-based Violence (GBV)	Minor (-)	Minor (-)
Archaeological and cultural heritage	Damage to graves and burial sites	Minor (-)	Negligible (-)
	Damage to ceremonial sites and places-of-power	Negligible (-)	Negligible (-)
	Excavation of Tertiary and Quaternary fossils	Negligible (-)	Negligible (+)
	Exposing unidentified/sub-surface archaeological remains	Negligible (-)	Negligible (+)
	Documentation of conflict sites within the proposed corridor	Moderate (-)	Minor (+)
Landscape and visual impacts	Visual impacts due to demining works	Minor (-)	Negligible (-)
	Visual impacts from construction works	Minor (-)	Minor (-)
Hazardous and non-hazardous waste management	Generation of waste	Minor (-)	Minor (-)
Operation			
Physical Environment			
Climate change	Increased GHG emissions	Moderate (-)	Moderate (-)
	Increased temperatures on personnel	Minor (-)	Minor (-)
	Increased temperatures on infrastructure	Negligible (-)	Negligible (-)
	High rainfall intensity on infrastructure	Minor (-)	Negligible (-)
Geology and geomorphology	Chemical contamination of geological formations	Minor (-)	Negligible (-)
Water Resources	Surface water resources	Minor (-)	Negligible (-)
Soils and land use capability	Soil erosion and topsoil loss	Moderate (-)	Minor (-)
	Changes to land use	Minor (-)	Negligible (-)
Biotic Environment			
Terrestrial ecology	Disturbance or loss of flora	Minor (-)	Negligible (-)
	Disturbance or loss of fauna	Negligible (-)	Negligible (-)
	Sensitive habitats	Moderate (-)	Negligible (-)
Avifauna	Avifaunal mortalities	Major (-)	Moderate (-)
Ecosystem services	Impact on ecosystem services	Moderate (-)	Negligible (-)
Socio-economic Environment			
Socio-economic	Increased availability of electricity	Major (+)	Major (+)
	Community health and safety	Minor (-)	Minor (-)
	Increased accessibility created inside the transmission line corridor	Minor (+)	Minor (+)
	Exposure of the area to external influences	Minor (-)	Minor (-)
Archaeological and cultural heritage	Documentation of conflict sites within the proposed corridor	Moderate (-)	Minor (+)
Landscape and visual impacts	Visual impact on rural settlements	Minor (-)	Minor (-)
	Visual impact on main access roads	Minor (-)	Minor (-)
	Visual impact on Bicuar National Park	Minor (-)	Minor (-)
	Visual impact on Cahama and Kapunda Kavilongo	Minor (-)	Minor (-)

Environmental aspect	Impact	Pre-mitigation	Post-mitigation
	Visual impact of Cahama substation	Minor (-)	Minor (-)
	Visual impact on receptors travelling to the border post or Ruacana Falls	Minor (-)	Minor (-)
Hazardous and non-hazardous waste management	Generation of waste	Minor (-)	Minor (-)

8.3 No-Go alternative

The No-Go alternative assumes that the project is not developed, and that the activity does not go ahead. This alternative provides the baseline scenario against which the preferred alternative, as the basis of this Report, can be compared. The No-Go alternative was assessed by each specialist as detailed in the respective studies summarised in Section 6.

In summary, the project has a number of potential negative environmental and social impacts which would not be experienced if the project did not go ahead. However, the benefits of the project would be foregone, and the opportunity to enhance energy security in the region, with associated indirect benefits such as cost savings, trade opportunities, electrification and environmental benefits from improved access to renewable energy, would not be achieved in this instance. Negative impacts of the No-Go alternative could include further environmental degradation as a result of drought, and anthropogenic influences such as overgrazing, exploitation of natural resources (such as water) and poaching. As a whole, these negative impacts are lower than the overall negative impacts, should the project go ahead.

8.4 Potential cumulative impacts

The impacts of the proposed project, in combination with other projects, including past, present and future proposals for the study area, as discussed in Section 6.1, have been assessed. Not all impacts have a cumulative impact, depending on their specific area of influence and their nature. The identified cumulative impacts are summarised in Table 8.2. The cumulative impacts depend largely on the application of the project-specific mitigation identified in Section 6.

Many of the negative impacts identified were rated as being of negligible or minor negative significance. However, there were a few negative moderate impacts of concern, and two major potential cumulative impacts, both associated with construction, namely the need for physical displacement and the loss of livelihoods.

Major positive cumulative impacts are the increased availability of electricity, which forms part of the motivation for the project, and the potential for job creation and documentation of conflict sites within the proposed corridor, which were all classified as moderate. Some minor cumulative impacts were also identified, as per Table 8.2.

Table 8.2: Cumulative impacts

Negative	Positive
Negligible	**Negligible**
• Construction: Potential loss/change of geological resources • Construction: Chemical contamination of geological formations • Operation: Chemical contamination of geological formations • Operation: Changes to land use • Construction: Air quality impact • Construction: Noise emissions • Operation: Disturbance or loss of flora	None

Negative	Positive
• Construction: Disturbance or loss of fauna • Operation: Disturbance or loss of fauna • Operation: Visual impact on the Bicuar National Park	
Minor	**Minor**
• Construction: Groundwater contamination • Operation: Groundwater contamination • Construction: Soil erosion and topsoil loss • Operation: Soil erosion and topsoil loss • Construction: Soil contamination • Construction: Changes to land use • Construction: Disturbance or loss of flora • Construction: Sensitive habitats • Construction: Disturbance of avifaunal habitat • Construction: Increased risk of contracting disease • Construction: Site health and safety • Construction: Social disruption as a result of construction workers • Construction: Discomfort due to construction activities • Construction: Gender-based Violence (GBV) • Operation: Community health and safety • Operation: Exposure of area to external influences • Construction: Damage to graves and burial sites • Construction: Damage to ceremonial sites and places-of-power • Construction: Exposing unidentified/sub-surface archaeological remains* • Construction: Excavation of Tertiary and Quaternary fossils* • Operation: Visual impact on receptors on main access roads • Operation: Visual impact on Cahama and Kapunda Kavilongo settlements • Operation: Visual impact as a result of the Cahama substation • Operation: Visual impact on receptors travelling to the border post or Ruacana Falls • Construction: Generation of waste • Operational: Generation of waste	• Construction: Sourcing of local goods and services • Operation: Increased accessibility to the transmission line corridor • Construction: Exposing unidentified/sub-surface archaeological remains* • Construction: Excavation of Tertiary and Quaternary fossils*
Moderate	**Moderate**
• Construction: Increased GHG emissions • Operation: Increased GHG emissions • Operation: Impacts on sensitive habitats • Operation: Avifaunal mortalities • Construction: Ecosystem services • Operation: Ecosystem services • Construction: Economic displacement – loss of natural resources	• Construction: Job creation • Construction: Documentation of conflict sites within the proposed corridor
Major	**Major**
• Construction: Physical displacement • Construction: Economic displacement – loss of livelihoods	• Operation: Increased availability of electricity

* expected impacts depend on how these findings are managed in the region

8.5 Cross-cutting issues

The assessment of impacts has been undertaken by specialists within specific disciplines and a number of cross-cutting issues across multiple disciplines have emerged. Cross-cutting themes are recognised in the IFC PS (2012). These are the presence of indigenous groups (IPs), the Himba/Mundimba and the San, gender, the context of climate change, water scarcity, and the provision of ecosystem services.

The Mundimba and the San, who are considered IPs, are also considered as 'vulnerable' as they experience higher degrees of poverty, social and economic exclusion than the general population, along with migrants, disabled, women and children. The local people, and specially the Mundimba and the San, rely on natural resources for survival and are subsistence farmers who farm with cattle, goats and crops.

The Mundimba and the San, who are considered IPs, are also considered as 'vulnerable' as they experience higher degrees of poverty, and social and economic exclusion, than the general population, along with migrants, disabled people, and women and children. The local people, and especially the Mundimba and the San, rely on natural resources for survival, and are subsistence farmers who farm with cattle, goats and crops.

Ecosystem services in the study area are very important due to the subsistence lifestyle of these rural communities, which make these populations directly dependent on the outputs of natural resources. These services include provisioning services (livestock, wild animals, plants for material and energy, surface and ground water); regulation and maintenance services (soil formation and composition, groundwater recharge, mitigation of waste and pollution, climate regulation, ventilation and evapotranspiration) and cultural (physical interactions and spiritual, symbolic and intellectual interactions). Climate affects the vulnerability of the local populations and exacerbates the difficulties experienced by the minority groups and the most vulnerable, including IPs. The main impact identified is caused by the drought and water scarcity in the region, which reflects a greater impact in the southern areas, and in the Cunene Province in particular, identified as the most affected within the Angolan territory and already declared as under state of emergency[1]. Future climate change can exacerbate their circumstances even further, as it is predicted that the climate in the concerned provinces will become hotter and drier. Women may be adversely impacted in this regard as their role is traditionally to collect water for the households, often at great distances, and are responsible for other tasks such as collecting firewood and productive tasks such as sowing, harvesting and transporting cereals when available.

The project is expected to affect local population directly, including IPs, through physical and economic displacement (livelihood and natural resources) and, eventually, by impacting local cultural practices, if graves, burial sites, ceremonial places or places-of-power are encountered, although this is not expected, based on current knowledge. Key mitigation in this regard is to avoid such impacts, where possible, during the pre-construction resettlement planning activities.

Although water is a scarce resource within the study area and may become scarcer due to climate change, the project will have no lasting impacts on water availability and will not directly exacerbate climate change in the region. Short-term construction impacts can be mitigated through best practice and water use efficiency, whilst during the operational lifespan of the project, water is not an input, nor is the project a source of pollutants that could be harmful to water resources, provided that best-practice measures common to such projects, as required in the ESMP (Volume III), are followed.

Stakeholder engagement throughout the entire project lifecycle that is inclusive of the IPs and other vulnerable groups, such as women, must aim to develop and sustain relationships to promote the meaningful sharing of information. This is included in the project's SEP and in the Vulnerable Group Plan (VGP) that form part of the Annexes to the ESMP (Volume III).

1 https://noticias.sapo.ao/actualidade/artigos/seca-ajuda-para-combater-seca-no-cunene-insuficiente-apesar-de-estado-de-emergencia

8.6 Sustainability in terms of the SDGs

The UN SDGs provide the framework for member countries to follow so as to approach development sustainably. Thus, the project's contribution to, or detraction from, the SDGs, can be considered a measure of its sustainability. Each SDG has a goal (as described in Section 3.3.4) and a list of indicators and targets. It has been evaluated whether the project contributes to, or detracts from, achieving the SDGs (refer to Table 8.3). The green and red cells are indicative of whether it is positive or negative. In the cases where it detracts, residual impacts will remain after mitigation. These impacts have been shaded in red. The primary motivation of the project is its contribution to SDG 7, which relates to improved access to affordable, reliable, sustainable and modern energy.

Table 8.3: Contribution to, or detraction from, the SDGs (with reference to indicators and targets)

SDG	Project's relevance	Contribution
SDG 1: No poverty	The project will contribute to this SDG though the provision of short-term construction jobs for unskilled community members. The use of local goods and services, where possible, will further benefit local households as it contributes to money being retained in the local economy. Furthermore, opportunities for net benefit include the provision of boreholes and "chimpacas" which can contribute to the improvement of communities' access to water in the absence of local service provision. Whilst these impacts on poverty reduction are minor, on a national scale, they are positive nevertheless and very significant on a local scale. Lastly, this SDG is also supported, in that communities in a climate-vulnerable country such as Angola, will have improved access to electricity as a basic service.	
SDG2: Zero hunger	The project could affect ecosystems that provide the basis for sustainable agricultural productivity as a result of the clearance of vegetation, erosion and pollution. When considered cumulatively with other developments in the region, the contribution is negligible. All these impacts will only have relevance within the construction phase, and mitigation has been included in this regard.	
SDG 3: Good health and well-being	The project could detract from this goal through facilitating the spread of diseases, like HIV, amongst workers and communities, through the introduction of social ills from a non-local workforce. This includes alcohol abuse, STDs and unwanted pregnancies. Furthermore, water, air and noise pollution could also impact health. All these impacts will only have relevance within the construction phase, and mitigation has been included in this regard.	
	At a strategic scale, the project will facilitate improved access to clean cooking and lighting through electrification, and thus has the potential to contribute to improved health through the reduction of emissions from the burning of biomass or other fossil fuels.	
SDG 5: Gender equality	Gender equality is recognised in the SEP and in the VGP to allow for effective participation by these groups. Furthermore, it is recommended that women are included in the offer of unskilled job opportunities.	
	Women are more vulnerable to the health impacts and gender-based violence discussed above, presented by a non-local workforce. These impacts will only have relevance within the construction phase, and mitigation has been included in this regard.	
SDG 6: Clean water and sanitation	The project could affect water resources on which the local community is reliant. These impacts will only have relevance within the construction phase, and mitigation has been included in this regard.	
	Opportunities for net benefit include the provision of boreholes and "chimpacas", which can contribute to the improvement of communities' access to water in the absence of local service provision.	
	The project requires water as a construction input, which is a scarce resource in the study area. Water efficiency during construction must be demonstrated, as set out in the ESMP (Vol. III).	
SDG 7: Ensure access to affordable, reliable, sustainable	Strategically, the project will improve access to affordable and reliable energy through the expansion of the regional network, including the improved integration and accessibility of renewable energy sources.	

SDG	Project's relevance	Contribution
and modern energy for all	In Angola specifically, it will provide greater grid stability, which facilitates and supports renewable energy generation, namely solar energy, and will enable the access to cleaner energy in rural villages in the south of the country. Another relevant benefit is the displacement of diesel generation and other energy sources in rural communities in the south of Angola, with a consequent reduction in carbon emissions, which will benefit not only the population, but also the natural resources. However, the project will not directly result in electrification – only indirectly, through the provision of the network in southern Angola which will support a secondary distribution network. This SDG promotes international co-ordination, and this project directly facilitates this though investment in infrastructure that will allow for the trade in cleaner energy sources.	
SDG 8: Decent work and economic growth	The project will provide temporary employment and procurement of local goods and services during construction (also applicable to SDG 1). Employment of youth is seen as a priority, and catering for the needs of women and other vulnerable groups is also very important.	
	The working environments associated with construction have inherent health and safety risks. However, safe working environments are supported, and mitigation has been provided in this regard.	
SDG 9: Industry, innovation and infrastructure	The project directly contributes to one of the indicators of this SDG, through the development of quality, reliable, sustainable and resilient infrastructure, and the provision of energy that supports economic development and human well-being, with a focus on affordable and equitable access for all.	
SDG 10: Reduced inequalities	The SEP and VGP (Annexed to the ESMP – Volume III) promote a participatory and equitable approach to stakeholder engagement throughout the project lifecycle to ensure that all members of the local communities, and especially the most vulnerable, including the IPs, have a voice.	
SDG 11: Sustainable cities and communities	This SDG focusses on cities and human settlements, and the indicators are not directly relevant to the project.	
SDG 12: Responsible consumption and production	Hazardous materials need to be properly handled, stored, transported and disposed of. The use of substances such as pesticides and herbicides need to be reduced as much as possible and, if still required, properly handled. This is provided for in the Hazardous Materials Management Plan included in the ESMP (Vol. III).	
	Waste generation should be properly managed through prevention, reduction, recycling and reuse. This is provided for in the Waste Management Plan included in the ESMP (Vol. III).	
	The responsible consumption of resources such as water and energy must be included throughout the project's lifecycle. This is provided for in the Resource Efficiency Management Plan included in the ESMP (Vol. III).	
	Awareness of sustainable development (including climate change) must be promoted through the community and worker awareness programmes, as proposed in the ESMP (Vol. III).	
	The displacement of diesel generation and other energy sources in rural communities in the south of Angola, with a consequent reduction in carbon emissions, is a major contribution to this SDG.	
	A net positive contribution of the project could include a plan/action to improve local livestock grazing management. Opportunities to partner with government departments or NGOs could be a potential area of opportunity worth investigating by the in the next phase of the project. Refer to Section 8.8 for the potential options for net benefit.	
SDG 13: Climate action	The displacement of diesel generation and other energy sources in rural communities in the south of Angola, with a consequent reduction in carbon emissions, is a major contribution to this SDG.	
	The contribution of the project to climate change, as well as the effects of climate change on the project, has been assessed, and mitigation provided. Construction impacts are inevitable due to the embodied emissions of the materials, and transport-related and vehicle emissions, whilst operational	

SDG	Project's relevance	Contribution
	impacts are limited. Institutional training will include climate change, since it is a cross-cutting issue across the IFC PS.	
SDG 14: Life below water	This SDG focuses on marine resources and is therefore not relevant to the ANNA project.	
SDG15: Life on land	The project requires clearance of tall vegetation along the servitude, which must be minimised, and affected sensitive areas should be avoided as far as possible. Impacts on ecosystem services and rare, threatened and endangered (R,T&E) species is limited with mitigation.	
	Invasive alien plants are not currently an issue in the study area, but could be introduced through the project.	
	Poaching by construction workers and maintenance staff during operation is a risk, and mitigation has been recommended in this regard.	
	The displacement of diesel generation and other energy sources in rural communities in the south of Angola, with a consequent reduction in carbon emissions, will benefit not only the population but also the natural resources.	
	Options for ensuring there is a net positive contribution of the project, such as contributing for the management of a protected area, are included in Section 8.8 and the preferred option will be investigated and selected at the next stage of the project.	
SDG 16: Peace, justice and strong institutions	An indicator is to ensure responsive, inclusive, participatory and representative decision-making at all levels. The SEP and VGP, included in the ESMP (Vol. III), promote a participatory and equitable approach to stakeholder engagement throughout the project lifecycle to ensure that all members of the affected communities, and especially the most vulnerable, including the IPs, have a voice.	
SDG 17: Partnerships for the goals	This SDG focusses on national partnerships, and the indicators are not directly relevant to the project although, being transboundary and facilitating energy trade, could be seen to be in support of this.	

8.7 Financial safeguard gap analysis

An evaluation of the project has been undertaken to check for compliance with the IFC PS (2012) and DBSA ESSS (2018) in order to identify risks, gaps and recommendations. The detailed matrix is included in Annexure C and the key findings are presented in Table 8.4.

Table 8.4: Financial safeguard gap analysis

PS / ESSS: Aspect	Sub-aspect	Description of gap / opportunity	Outside scope of ESIA	Compliance w.r.t. ESIA[1]	Gaps: Not applicable to project activity	Gaps: Not possible due to level of detail of design	Responsibility	Timing
IFC PS1 **DBSA ESS1** General principles for environmental and social management	Assessment	Natural capital potential losses were quantified at a high level in Section 6.2.4.2.3 (not mandatory for medium risk project). The expected impacts were classified as negligible (-) after mitigation.			x	x	N/A	N/A
	Adoption of mitigation hierarchy	Confirmation of avoidance of sensitive features is only possible during the detailed design, following further fieldwork and consultation. Similarly, net benefits (as discussed in Section 8.8 below) will be investigated outside of the process.				x	Specialists (appointed by SAPP)	Pre-construction
	Decommissioning phase excluded from assessment	Decommissioning has not been assessed in the impact assessment as it is not the intention to decommission the line. Justification for this is provided in Section 2.8. However, recommendations for the development of the Decommissioning Plan, were included in the ESMP (Vol. III), should decommissioning be required in the future.					RNT	Decommissioning
	Climate change transboundary impacts	Refer to resource efficiency, pollution prevention and management below.					N/A	N/A
	Cumulative impacts	There was uncertainty with regards to the exact location of proposed transmission infrastructure, especially in Angola, and impacts were assessed at a high level.				x	N/A	N/A
	Mitigation	Refer to Adoption of mitigation hierarchy above. Net benefits to investigated outside of the ESIA process.				x	Specialists (appointed by SAPP)	Pre-construction

1 Red = Not compliant; Green = Compliant, Orange = To be completed outside ESIA

PS / ESSS: Aspect	Sub-aspect	Description of gap / opportunity	Gaps: Outside scope of ESIA	Gaps: Compliance w.r.t. ESIA1	Gaps: Not applicable to project activity	Gaps: Not possible due to level of detail of design	Responsibility	Timing
	Costing of mitigation	Where further studies are required, detailed mitigation is not necessarily known. Therefore, in some cases, only the cost of these further studies has been provided. For example, the GHG emissions plan may recommend further actions.				X	Specialists (appointed by SAPP)	Pre-construction
	Compliance with Angolan legal requirements	Compliance with legislation, regarding obtaining certain permits, is not within the scope of the ESIA but has been identified in the ESMP (Vol. III).	x			x	RNT	Pre-construction
	ESMS	ESMS to be developed and implemented. Refer to Institutional capacity below.	x				SAPP/RNT	Pre-construction
	Institutional capacity	The institutional capacity of RNT, as the implementing agent, is unknown, and therefore any training in this regard to build capacity to implement and monitor compliance with the ESMP (Vol. III), requires further investigation, and can be included as part of the ESMS.	x				SAPP	Pre-construction
IFC PS1 **DBSA ESS2** Stakeholder engagement and information disclosure	SEP	The stakeholders have not yet been provided with a copy of the SEP, but this will be part of the ESIA disclosure to ensure compliance.					Aurecon	ESIA Disclosure
	Vulnerable Groups	Refer to resettlement, indigenous groups, cultural heritage and gender below.						
	FPIC	Refer to resettlement, indigenous groups, cultural heritage and gender below.						
IFC PS2 **DBSA ESSS6** Labour and working conditions	Operational Health and Safety (OHS) Plan	An OHS Plan is required. However, this is outside the scope of the ESIA and should be included as part of the contractor's Health, Safety and Environment Management System for construction and RNT's system as part of operation. The ESMP includes some provisions based on the IFC EHS Guidance.	x				Contractor RNT	Pre-construction and Construction Operation

PS / ESSS: Aspect	Sub-aspect	Description of gap / opportunity	Gaps				Responsibility	Timing
			Outside scope of ESIA	Compliance w.r.t. ESIA1	Not applicable to project activity	Not possible due to level of detail of design		
IFC PS3 **DBSA ESSS10** Resource efficiency, pollution prevention and management	GHG emissions	Operational GHG Emissions have not been calculated. A transmission line is considered to be below the reporting thresholds for operational GHG emissions identified. Nevertheless, a GHG Emissions Management Plan is recommended at the pre-construction phase.						
	Quantification of water consumption and waste generated	Quantification is not required for medium risk projects and the project, when operational, will use insignificant volumes of water, generate insignificant levels of pollution and release insignificant hazardous materials. Furthermore, this information cannot be generated, based on the current stage in the project lifecycle. However, measures to address resource efficiency and pollution prevention are included in the ESMP (Vol. III).			x	x	Contractor	Pre-construction and Construction
IFC PS4 **DBSA ESSS7** Community health, safety and security	Framework Emergency Preparedness and Response Plan	A framework Emergency Preparedness and Response Plan has been included in the ESMP (Vol. III). However, it will require expansion by the relevant parties, as the specific hazards and detailed responses require their inputs.				x	Contractor RNT	Pre-construction and Construction Operation
IFC PS5 **DBSA ESSS5** Land acquisition and involuntary resettlement	Quantification of impact	The number of structures potentially affected, is currently unknown. Additionally, the detailed impacts on cultural sites, livelihoods and access to natural resources cannot be identified based on the current level of project design. An RPF has been developed, and a detailed RAP will need to be developed and implemented, to identify appropriate compensation. The approach will be to avoid impacts where possible, by siting pylons accordingly during the detailed design.				x	Resettlement specialist (appointed by SAPP) Contractor	Pre-construction Pre-construction
	Consent	Refer to Indigenous Peoples below.						

			Gaps					
PS / ESSS: Aspect	Sub-aspect	Description of gap / opportunity	Outside scope of ESIA	Compliance w.r.t. ESIA1	Not applicable to project activity	Not possible due to level of detail of design	Responsibility	Timing
	Critical heritage identification	Refer to cultural heritage below.						
IFC PS6 **DBSA ESSS9** Biodiversity conservation and sustainable natural resource management	Quantification of impacts	Impacts have not been quantified in detail, but a high-level estimation of the potential land use losses (refer to Section 6.2.4.2.3) was made, to support the assessment of project impacts. No critical habitats were identified within the study area and most of the impacts on the biotic environment (Section 6.3) were classified as negligible (-) after mitigation. The operational impacts on avifaunal mortalities were classified as moderate (-) after mitigation (Table 6.35)				x	N/A	N/A
	Valuation of ecosystem services	The impact on ecosystem services is assessed as having a negligible (-) residual impact. Most impacts are likely to occur during construction, and are short term. It has not been possible to valuate the loss of services, as the details of the development are not finalised and it is not considered as adding value to the EIAS process. The most relevant (lasting) impacts can be quantified when developing the RAP (e.g. identification of dependency of natural resources, vegetation to be cleared, and impact on cultural sites, etc). The recommendation for the provision of water resources to the communities (boreholes and/or “chimpacas”) is considered to be adequate compensation as a provisioning service.				x	Resettlement specialist (appointed by SAPP)	Pre-construction
	Limitations of fieldwork	Botanical studies were limited to a rapid assessment of the larger potentially-affected trees/shrubs along the route, in April 2019. Grasses were not identified along the route, but were limited to a literature study only.					Ecology/Biology specialist (appointed by SAPP)	Pre-construction

					Gaps			
PS / ESSS: Aspect	**Sub-aspect**	**Description of gap / opportunity**	**Outside scope of ESIA**	**Compliance w.r.t. ESIA1**	**Not applicable to project activity**	**Not possible due to level of detail of design**	**Responsibility**	**Timing**
		Flora is best assessed over a full season (often more than one season), especially in marginal areas with vegetation – particularly annuals and other rare species – directly stimulated by localised rainfall. However, the rapid survey confirmed (although was not limited to) the presence of perennial species. Vertebrate faunal studies were limited to a comprehensive literature study. A detailed walk-down must be undertaken to inform the detailed design. It is unknown in which season this will take place. The nature of the project does not warrant faunal surveys.			x	x		
IFC PS7 **DBSA ESSS4** Indigenous peoples	Informed Consultation and Participation	Informed consultation and participation commenced during the Scoping Phase. Some PACs, which include IPs (Himba and San ethnic groups in Angola), were identified during the scoping phase and will be consulted during the ESIA phase to ensure compliance.					Aurecon	ESIA Disclosure
	Consent	With regards to FPIC, Scoping Phase consultations indicate that the project is generally well received by the PACs (including the IPs), as long as they are fairly compensated. Informed consultation and participation commenced during the Scoping Phase and will continue during the ESIA phase to ensure compliance.					Aurecon Resettlement specialist (appointed by SAPP)	ESIA Disclosure Pre-construction
IFC PS8 **DBSA ESS8** Cultural heritage	Critical heritage identification	The project has the potential to impact Himba and San culture, including burial sites (accepted as 'critical cultural heritage'). The exact extent has not yet been identified. PACs have been consulted and further consultation will be undertaken during ESIA disclosure. A GM will be available during the project lifecycle.				x	Aurecon Heritage specialist and	ESIA Disclosure Pre-construction

					Gaps			
PS / ESSS: Aspect	**Sub-aspect**	**Description of gap / opportunity**	**Outside scope of ESIA**	**Compliance w.r.t. ESIA1**	**Not applicable to project activity**	**Not possible due to level of detail of design**	**Responsibility**	**Timing**
		A heritage walk-down, and the RAP, will identify burial sites through fieldwork and consultation with PACs. Such sites should be managed by means of a Grave Relocation Plan. This requires FPIC.					resettlement specialist (appointed by SAPP)	
DBSA ESSS3 Gender mainstreaming	Proactive engagement of women	Initial stakeholder engagement during the Scoping Phase did not actively target women. ESIA disclosure will actively target, and document attendance of, women, specifically to achieve compliance. Vulnerability of women and GBV has been addressed in the recommendations in the ESMP (Vol. III).					Aurecon	ESIA Disclosure

8.8 Final recommendations and way forward

This document represents the Environmental and Social Impact Assessment (ESIA) Report for the Angolan portion of the Angola–Namibia Transmission Interconnector Project (ANNA) and, as mentioned before, the complete ESIA document is divided into three volumes: Volume I consists of the Non-Technical Summary (NTS), Volume II comprises this document, the ESIA Report, and Volume III constitutes the Environmental and Social management Plan (ESMP).

The ANNA project was conceived from its start with the objective of promoting the highest positive economic, social and environmental impact possible whilst ensuring that all negative social and environmental impacts are addressed by avoiding negative impacts, or where they can't be avoided, minimising and compensating over and above the estimated impacts. This philosophy aims to ensure that the project attains a net positive social and environmental impact and contributes to the overall sustainable development of Angola and Namibia. These considerations were included in the initial conception of the project by means of selecting a route for the transmission line corridor that would avoid all identified sensitive environmental and social resources, as much as possible.

Included in the project's overarching objectives is the aim to contribute towards the UNDP Sustainable Development Goals (SDGs), and demonstrate progress towards the additional objective of climate co-benefits. As such, project design also included the applicable mitigation and adaptation measures, in order to minimise its vulnerability to climate change and increase its resilience.

As previously mentioned, the ANNA project involves the development of a 400 kV overhead transmission line, with a total length of approximately 362 km from the proposed Lubango substation in Angola, to the proposed Kunene substation in Namibia, 331 km of which falls within Angola and is the subject of this ESIA process. This ESIA report assessed a 2 km wide corridor for this length (1 km on either side of the centreline of the proposed line), referred to as 'the study area'. The transmission line servitude of approximately 55 m wide, will be located within this 2 km wide corridor.

The project is currently in the conceptual design phase and detailed design is not yet available. The transmission line will be owned and operated by RNT.

The proposed ANNA 400 kV transmission line project's main objective is to expand electricity supply capacity in the SADC region, enhancing the availability and reliability of electricity supply in the respective countries, and facilitating electricity trade in the SAPP grid, thus also providing an opportunity to support increased use of renewable energy in the SAPP region.

The preferred alignment for the ANNA transmission line has been assessed against the No-Go alternative. At the pre-feasibility phase, a high-level screening and assessment of the general study area was undertaken to determine constraints and opportunities associated with the project, and to develop potential line route corridors between southern Angola and northern Namibia. The process involved the identification of initial corridor options, development of a preferred corridor and then of a preferred alignment, which forms the basis of this assessment. This process was multi-disciplinary and involved the selection of the best route on the basis of technical (including financial), strategic (in terms of Baynes Hydro-power project likelihood), environmental (ecology and ecosystem services, protected areas, bird and bat areas) and social (displacement, proximity to settlements and visibility), as well as slope (constructability). Therefore, from the outset, and prior to the formal start of the ESIA process, the principle of avoidance has been applied to arrive at the most preferred alternative.

The need and desirability of the project is that it supports Angola's economic growth by means of providing grid stability, with associated reliability of supply, improved integration and accessibility of renewable energy, and associated trade opportunities. This is therefore the most significant benefit of the project that has emerged during this assessment and was rated as an impact of major positive significance. The positive impact of demining was also rated as an impact of major positive significance, since it will improve safety for the communities residing in the corridor. Furthermore, a community benefit will be the unskilled job opportunities generated during construction (moderate positive significance) and the sourcing of local goods and services during construction (minor positive significance), which must be enhanced through a Local Procurement Plan. Excavations may also lead to positive impacts (negligible significance), through the expansion of knowledge if fossil and archaeological finds are encountered and duly recorded/preserved. A "chance finds protocol" has been recommended in this regard. Lastly, the opening of the corridor area will enable the collection and documentation of historical data, namely conflict sites and records/stories, which constitutes a positive impact (minor significance).

Most of the negative project impacts are incurred during the construction phase as a result of activities such as the establishment of the construction camps, excavation of the foundations for the pylons and the Cahama substation, clearance of the servitude access and the establishment of any additional access roads. These result in physical displacement of communities and sites of cultural significance, economic displacement (in relation to livelihoods and natural resources), clearance of vegetation and the associated land uses, disturbance of fauna and avifauna, and potential impacts on buried heritage resources. Abstraction of water will also be required, and waste will be generated. Other ongoing activities such as the movement and operation of heavy vehicles and machinery, and the presence of non-local workers, will cause disruption such as noise and air emissions, as well as potential soil and water pollution. Health and safety for workers and communities are also a potential impact. Social ills, such as an increased risk of contracting diseases, of petty crime, illicit activity, alcohol and drugs, and unplanned pregnancies, as well as visual impacts and conflicts caused by failure to respect the culture of the local communities, may also occur. Ecosystem services could be affected by a number of these collective impacts. During construction the embodied GHG emissions of the required materials will be incurred, which is in addition to the emissions from the transport thereof.

Many of these impacts can be reduced by applying general good practices on site through avoidance or minimisation (e.g. regarding management of topsoil, waste, wastewater, concrete batching, chemicals and spills, stormwater runoff and water usage, and choice of equipment and fuel), with the implementation of workforce and community awareness programmes and the application of a contractor's Code of Conduct, to reduce social and environmental impacts. Rehabilitation of all areas affected by the construction works is also a key measure to ensure that the temporary impacts are reversed.

To address the identified negative social impacts associated with economic and physical displacement of communities, including cultural resources (such as graves, ceremonial sites or places-of-power), a comprehensive resettlement planning process, prior to construction, must be put in place. All forms of resettlement (physical and economic displacement) should be avoided as much as possible. This can only be possible through a significant level of engagement of PACs, and with detailed social surveys, to confirm the extent of the required displacement, and to prioritise avoidance where possible, and compensation and livelihood restoration where necessary.

Of utmost importance is the implementation of the Stakeholder Engagement Plan (SEP), in collaboration with the local traditional and statutory authorities, to keep stakeholders, and in particular communities, informed of activities in the most culturally-appropriate methods, with regular opportunities for engagement. This provides for the establishment of a Grievance Mechanism (GM) through which the communities can lodge any grievances.

Following application of the mitigation measures stated above, the most significant residual impacts are those associated with the GHG emissions, rated as being of negative moderate significance. The displacement impacts, the effect of increased temperatures on working personnel, the visual impacts, and the generation of waste, are rated as being of negative minor significance. The remaining residual negative impacts are of negligible significance.

During the operational phase, the infrastructure requires no major natural resource inputs (such as water) and will not result in any notable pollution emissions (such as air, soil or water). The most significant impacts are due to the clearance of vegetation in the servitude, either manually or with herbicides, with associated impacts on fauna and flora, soil erosion, and soil and water pollution (and therefore on ecosystem services), as well as visual impact, avifaunal mortalities (mostly from collisions or electrocutions), health and safety of communities, and waste generation associated primarily with the maintenance of the Cahama substation.

Most notably, the residual impacts from GHG emissions and avifaunal mortalities are of moderate negative significance. The residual impacts on soils, health and safety, visual impacts, and the effect of an increase in temperatures on working personnel, are considered of minor negative significance. The remaining residual negative impacts are of negligible significance.

Key mitigation includes siting and designing of pylons and access roads, and the final location of the Cahama substation, away from sensitive areas, to avoid established vegetation, and to include deterrents for large mammals. The proper design and maintenance of access roads, to reduce erosion, is also crucial and needs to be monitored.

Installation of bird avoidance measures in sensitive areas such as the Caculuvar and Cunene Rivers, the inselbergs (mountains) and the ephemeral drainage lines, is considered essential to mitigate the impact that can potentially have a higher significance, if not duly addressed. In this respect, monitoring programmes for bird collision, reptile and mammal mortality, as well as a hazardous materials, were included as part of the ESMP's (Vol. III) operational activities.

Maintenance activities should also limit the extent of vegetation clearance, whereby only individual trees that pose a risk, should be removed. Climate change-related mitigation includes a GHG management plan to manage emissions throughout the project lifecycle.

Social mitigation includes the implementation of a proper awareness programme for communities and RNT staff regarding health and safety and other environmental issues, such as poaching, driving and road discipline, identification of alien invasive and protected tree species. The SEP and Grievance Mechanism will remain in place during the operational phase of the project to provide opportunities for stakeholders, especially communities, to engage with RNT. Impacts of projected climate change scenarios on the project have the potential to impact infrastructure and personnel and have also been assessed and, with mitigation, are of negligible or minor negative significance. Mitigation includes the establishment of a heat stress prevention program for construction and maintenance personnel, demand management (in the unlikely event of capacity issues), improved flood protection design of infrastructure, forecasting of events and rapid emergency repair teams.

There is no intention to decommission the project. However, should the line require decommissioning in the future, a decommissioning plan must be compiled, based on conditions at that time, and in accordance with what is stated in the ESMP (Vol. III).

The potentially most significant cumulative impacts of the project, when considered with other potential future developments such as the proposed Baynes Hydro-power facility, other transmission lines, as well as mining, and large agricultural and cattle farms in the region, are the construction impacts as a result of physical and economic displacement (both with a major negative significance). The potentially moderate negative cumulative impacts associated with the project include the construction and operational impacts due to increased GHG emissions, operational impacts on sensitive habitats and avifauna mortalities, construction and operational impacts on the provision of ecosystem services, and the economic displacement due to the loss of natural resources during construction. Project-specific mitigation is recommended to minimise the contribution towards these impacts. However, moderate significant residual impacts may remain throughout the operational phase.

Of note is the existence of potential positive cumulative impacts, namely the increased availability of electricity in the operational phase (major significance), the potential for job creation in the construction phase, and the potential for documentation of conflict sites within the proposed corridor in the operational phase, the latter two both considered as being of moderate significance.

During this ESIA, the No-Go alternative was assessed, and it was considered that, although this alternative presents limited negative impacts, it is not supported, due to the lost opportunity for strategic economic benefits. The interconnector has the potential to support Angola's economic growth through grid stability and the associated reliability of supply, improved integration and accessibility of renewable energy, and associated trade opportunities. Regional emission reductions in most of the business case scenarios has indirect benefits for biodiversity and ecosystem services through climate change mitigation, improved human health through the displacement of diesel generators, and electrification of areas and associated socio-economic benefits. The need and desirability and regional benefits of the project can collectively be interpreted as an overarching net benefit that is provided by the project when measured against the localised negative project impacts. After consideration of all residual impacts, the evaluation of the project's sustainability (through the SDGs), and considering the fact that no fatal flaws or exceedance of critical thresholds are expected, the project is considered acceptable. This is on condition that the final design is aligned within the identified corridor assessed herein, and that the measures detailed in the ESMP (Volume III), including the SEP, VGP and RPF, are implemented. Most importantly, prior to construction, a walk-down must be done by ecology, heritage, social and resettlement specialists, to ensure that resettlement, ecology and heritage, as well as demining impacts, are avoided as far as possible. This will allow for the identification of specific sensitive habitats, sensitive or protected species, cultural sites (including graves) and local community resources such as shelter, livelihood assets and natural resources, that are to be avoided by the infrastructure. This will inform the detailed design, and it is important to emphasise that, prior to any construction activity, a RAP and a Demining Plan must be duly implemented.

The team that developed this ESIA documentation believes that the information contained therein, including all associated documentation, is adequate to inform DNPAIA in their decision-making regarding the ESIA process. It is also considered that all key impacts have been identified and that appropriate management measures have been assigned to manage these impacts. Although the study area is large, and specialists were not able to assess the entire area in detail, the experience of the specialists, and their knowledge of the area from previously-conducted studies in the area, the availability of high quality aerial imagery to inform areas that needed to be ground-truthed, and the relative homogeneity of the area, all contribute to provide a high degree of confidence in the specialist assessments.

All requirements considered necessary to ensure the Environmental and Social Management of the whole project's lifecycle were included in the ESMP (Volume III), from pre-construction to decommissioning. Compliance and strict adherence to all recommendations, roles and responsibilities, management and monitoring plans, and training and awareness plans included in this ESMP, should be followed at all times and by all parties involved in the project's design, implementation and operation.

It is critical that the project demonstrates a net positive contribution and this has been one of the project objectives from the outset. A number of options have been identified and there is a commitment to implement one of these options at the next stage. Note that this will be implemented in addition to any livelihood restoration activities identified in the first bullet. These are as follows:

- One of the issues raised by communities is that water availability is a major constraint on their livelihoods. The limited available water resources (surface and subterranean) are sometimes reported as being unfit for livestock and human consumption. It is recommended that the social consultants appointed during implementation, along with communities and traditional authorities, identify the most suitable locations for the implementation of boreholes and "chimpacas" within the corridor's area of influence. As a preliminary approach, it is proposed to create two (2) boreholes and nine (9) "chimpacas" (1 per affected communal administration) and fund the execution of this infrastructure. These numbers should be reviewed, after quantification of affected VGs during RAP surveys..
- A further issue raised by communities is that they have poor, to no, electricity supply and, if the powerline should pass through their area, it should bring some tangible benefits in the form of a more secure and reliable power supply. To ensure a net positive gain from the project, and to offset the negative impacts associated with the lack of perceived benefits, it is recommended that the social consultants appointed during implementation investigate this option. It will involve assessing which communities along the route are most affected by the lack of power, and install, for example, solar panels at agreed locations/infrastructure (such as schools, health centres, administrative

buildings, etc.) to allow for a secure and reliable power supply for the communities. The proposed approach is similar to that adopted for the improved access to water resources in the point above. It is thus proposed to nstallnine (9) solar panels (1 per affected communal administration) to serve selected community infrastructure. This will be informed bythe feedback attained during the project's stakeholder engagement, both for this ESIA and within the scope of the Resettlement Action Plan (RAP) to be developed before project implementation.

- With regards to habitat loss, although no critical habitat has been identified as being impacted, it is estimated that a maximum area of 1 982 ha will be cleared[1]. In order to mitigate the potential loss of natural habitat, it is recommended that consultation with the Angolan Environmental Ministry, Provincial Administrations, and eventually with other national institutions and NGOs, be undertaken, in order to investigate the possibility of contributing to an existing and/or relevant project within the concerned region. As stated in Section 5.3.2.1.2, a study recently developed for the Bicuari National Park (Overton, 2017) considers that this park would make an excellent candidate for a co-management relationship to help provide funds and other support its management and protection.
- In the southern part of the Cunene Province, overgrazing by domestic livestock (mainly cattle) likely has a large impact on the local biodiversity, in particular around water sources, and improved livestock grazing management would enhance the local environment. Opportunities to partner with government departments or NGOs could be a potential area of opportunity.
- Further research related to the cultural landscape of the corridor and its associated sites, can be done through creating opportunities for local people to be trained in conducting research and documenting heritage. This could also be an opportunity worth investigating during the project's implementation.

A preliminary estimation of the budget to be allocated to these net positive contribution initiatives was included in the ESMP (Volume III). This will ensure that the ANNA Project includes financial provisions for the implementation of the above-mentioned activities and thus fulfil its commitment to contribute towards the sustainable development of the affected region, by addressing identified local environmental and social needs.

The proposed options for net positive contribution may change as the project develops. A preferred option may be identified through the project's stakeholder engagement for this ESIA and for the RAP, that might prove to be preferred by the affected communities, or that may be proposed by a government department or NGO to support an ongoing or planned project within the region.

1 As a worst-case scenario, it is assumed that all vegetation within a 60 m corridor would be lost, even though only the 12 m area directly below the line requires clearance of obstacles (and not clear-felling), so the actual loss is expected to be much less than this.

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Annexures

Annexure A: Environmental Consultant Certificate
Annexure B: Minutes of the meeting with DNPAIA and project registration
Annexure C: IFC and DBSA requirements and applicability
Annexure D: Reply from concerned Authorities
Annexure E: Biotic environment – supporting tables
Annexure D: Heritage photographic register

Annexure A: Environmental Consultant Certificate

Registo n.º
Fls 01
Livro n.º A-1

República de Angola

Ministério do Ambiente

CERTIFICADO

a) GABINETE JURÍDICO

Nos termos do Decreto n.º 59/07, de 13 de Julho, tendo sido cumpridas todas as formalidades previstas nos artigos 29º, 30º e 31º do referido diploma, e não havendo impedimento legal, é emitido o presente Certificado de Registo a favor de:

b) AURECON ANGOLA, LDA.

Emitido aos	Válido até
Dia 30/01 /2019	Dia 30/01/2020

Certificado de Registo de Consultor Ambiental
MINAMB

O DIRECTOR DO GABINETE
MIRANDA CANDIDO KIALA

REPÚBLICA DE ANGOLA
SECRETARIA GERAL

a) Direcção, Gabinete, Departamento ou Instituto
b) Consultor, Sociedade de Consultoria ou Consórcio

Annexure B: Minutes of the meeting with DNPAIA and project registration

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Meeting Record

Project number	**113550**	Meeting date	**2018-09-03**
Project name	**ANNA Transmission line**	Recorded by	**YSC**
Meeting/subject	**Presentation to the Authorities**	Total pages	**1**

Present	Apology	Copy	Name	Organisation	Contact details
☑	☐	☐	Ana Yolanda	MINAMB	
☑	☐	☐	António Barreto dos Santos	Aurecon Angola	
☑	☐	☐	Joaquim Boaventura	RNT	
☑	☐	☐	Tárcio Cardoso	RNT	
☑	☐	☐	Yassimina Silva da Costa		
☐	☐	☐			
☐	☐	☐			

Item	Topic	Action by	Action due	Action complete
1	Presentation of the project	YSC	2018-09-03	2018-09-03
2	Approach from the MINAMB about Project registration, the environmental and social descriptor and licensing process of the subconsultants	AY	Select date	Select date
3	RNT agreed to submit the Project registration Process in 2 weeks' time	TC & JB	Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date

Next meeting: Select date

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Meeting Record

Project number	**113550**	Meeting date	**2018-12-17**
Project name	**ANNA Transmission Project**	Recorded by	**YSC**
Meeting/subject	**Demining Process**	Total pages	**1**

Present	Apology	Copy	Name	Organisation	Contact details
☑	☐	☐	General Afonso Calei	CED/MINDEF	
☑	☐	☐	Coronel Anacleto	CED/MINDEF	
☑	☐	☐	António Inglês Pinto	RNT	
☑	☐	☐	Coronel João Sebastião	CED/MINDEF	
☑	☐	☐	Feliciano Samba	RNT	
☑	☐	☐	Hugo Costa	Aurecon Angola	
☑	☐	☐	Tárcio Cardoso	RNT	
☑	☐	☐	Yassimina Silva da Costa	Aurecon Angola	
☐	☐	☐			
☐	☐	☐			

Item	Topic	Action by	Action due	Action complete
1	Presentation of the project	AIP	2018-12-17	2018-12-17
2	Approach of the Consultant about the areas and collaboration needed	HG	Select date	Select date
3	Was clarified that will be no demining for this phase of the project. A team of 12 of the CED will be participating the field work to guide through safe areas	GAC	Select date	Select date
4	Aurecon will define the Action Plan with timings.	AIP /HC	2019-01-11	2019-02-07
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date

Next meeting: Select date

AO
MINISTÉRIO DO AMBIENTE
Direcção Nacional de Prevenção e Avaliação de Impactos Ambientais
Engª Nelma Caetano
MINAMB

LUANDA

N/REF 3883 / 571 /GPCA-RNT/2018

ASSUNTO: REGISTO DO ESTUDO DE IMPACTO AMBIENTAL DO PROJECTO DE CONSTRUÇÃO DA LINHA DE INTERLIGAÇÃO ANGOLA-NAMÍBIA

Excelentissima Senhora Directora,

Queiram, antes de mais, aceitar as nossas cordiais saudações.

A Empresa Rede Nacional de Transporte de Electricidade, Empresa Pública tutelada pelo Ministério da Energia e Águas, está a desenvolver um projecto de construção da linha de transporte de energia Eléctrica à 400 kV para interligação dos sistemas electricos de Angola e Namibia. Em cumprimento do estipulado no Decreto Executivo nº 92/12 de 1 de Março, vem por meio desta, solicitar o Registo do Projecto em epígrafe para a elaboração do respectivo Estudo de Impacto Ambiental, remetendo para os devidos efeitos os Modelos de Requerimento devidamente preenchidos (Anexo I – Ficha de Inscrição e Anexo I – Descrição Simplificada do Projecto), bem como o documento descrito no campo nº 4 deste mesmo decreto.

Sem outro assunto de momento, queira aceitar, Excelentíssima Senhora, a expressão da nossa alta consideração.

Atentamente

GABINETE DO PRESIDENTE DO CONSELHO DE ADMINISTRAÇÃO DA RNT-EP, em Luanda, aos 26 de Novembro de 2018.

O PRESIDENTE DO CONSELHO DE ADMINISTRAÇÃO

RUI PEREIRA DO AMARAL GOURGEL

RECEBI: WILSON
AOS 28-11-2018

Annexure C: IFC and DBSA requirements and applicability

IFC and DBSA Standards and Applicability to the ANNA Project

IFC PS		DBSA ESSS		Applicability to the project
PS1: Assessment and management of environmental and social risks and impacts	• Identify and evaluate environmental and social risks and impacts of the project. • Adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimise, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment. • Promote improved environmental and social performance of clients through the effective use of management systems. • Ensure that grievances from Affected Communities, and external communications from other stakeholders, are responded to and managed appropriately. • Promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them, and to ensure that relevant environmental and social information is disclosed and disseminated.	**ESSS1:** Project screening: environmental and social risks, impacts and opportunities **ESSS2**: Stakeholder engagement and information disclosure	• Screen the project as early as possible to categorise and manage the project according to the degree of environmental and social risk. • Apply appropriate measures to screen for, and report on, greenhouse gas emissions, climate change impacts, climate change mitigation and adaptation measures, and carbon emission estimates. • Develop an Integrated Environmental and Social Management Framework to address and manage project environmental and social risks and impacts/dependencies, and to promote improved environmental and social outcomes. • Apply appropriate environmental management tools and approaches throughout the project lifecycle. • Detailed alignment with relevant and appropriate applicable international, national laws, regulations and authorisations required, to develop and implement the project. • Seek opportunities for positive impact outcome. • Outline procedures for natural capital/ecosystem services vulnerability screening.	• This project was considered a Category 2/B activity: Medium Risk. The motivation is discussed in Section 3.4. • A Scoping Report (SR), including ToR for the ESIA, was compiled. The approach is summarised in Section 4. • Legal requirements to undertake the activity have been identified in Section 3. • The mitigation hierarchy was applied by including environmental risks during route selection while doing pre-feasibility planning, and providing for a walk-down after ESIA approval to inform the detailed design. • Environmental impacts are assessed in Section 6. The assessment has been undertaken to the level of project design. • The Environmental and Social Management Plan (ESMP – Vol. III) includes mitigation measures identified by the specialists to manage risks and impacts associated with the project on an ongoing basis. • Opportunities for net positive impact are described in Section 8.8. • A Climate Change Impact Assessment is included in Section 6.2.1 and is adapted to project activity and design stage. • A framework Emergency Preparedness and Response Plan is included in the ESMP (Vol. III). • Stakeholder engagement commenced with the fieldwork for the SR and included engagement with affected communities. This is described in Section 5.5. The SEP and VGP, included as annexures of the ESMP, provide for engagement during the remaining project lifecycle.

IFC PS		DBSA ESSS		Applicability to the project
PS2: Labour and working conditions	• Promote the fair treatment, non-discrimination and equal opportunity of workers. • Establish, maintain and improve the worker-management relationship. • Promote compliance with national employment and labour laws. • Protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain. • Promote safe and healthy working conditions, and the health of workers. • Avoid the use of forced labour.	**ESSS6:** Labour and working conditions	• Promote fair treatment, non-discrimination and equal opportunity of project workers. • Protect workers, especially vulnerable workers such as women, persons with disabilities, migrant and contract workers, as appropriate. • Promote health and safety in the workplace. • Prevent the use of all forms of forced and/or child labour. • Provide workers with accessible means to raise workplace concerns.	• An OHS Plan should be developed as part of the Health, Safety and Environmental Management System (outside the scope of the ESIA process) for construction and operational phases. • The ESMP (Vol. III) includes recommendations to protect the workers and ensure their welfare, applicable to the level of project design. • A Grievance Mechanism (GM) including for workers, forms a part of the ESMP (Vol. III).
PS3: Resource efficiency and pollution prevention	• Avoid or minimise adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. • Promote more sustainable use of resources, including energy and water. • Reduce project-related GHG emissions.	**ESSS10:** Resource efficiency, pollution prevention and management	• Promote the sustainable and efficient use of energy, water, other raw natural materials and resources. • Promote adoption and dissemination of cleaner technologies and practices. • Promote an integrated approach to pollution and pest management that reduces chemical product dependency. • Promote effective and efficient waste management practices. • Protect human health and a non-toxic environment.	• A Climate Change Impact Assessment is included in Section 6.2.1 and is adapted to project activity and design stage. • During operation, the project is unlikely to use significant volumes of water, generate significant levels of pollution, or release hazardous materials. • The ESMP (Vol. III) includes the following considerations: – Water management and conservation – Prevention of pollution of water resources and soils – Handling and storage of hazardous materials including pesticide/ herbicide management – Waste management – Energy and water efficiency
PS4: Community health, safety and security	• Anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances. • Ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles, and in a manner that	**ESSS7:** Community health and safety	• Anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project lifecycle. • Promote quality and safety in the infrastructure design and construction. • Avoid or minimise community exposure to project-related traffic and	• Infrastructure and equipment design and safety will be addressed by the engineers and contractors. This requirement is included in the ESMP (Vol. III). • The ESMP includes the following: – Handling and storage of hazardous materials, including a Herbicide Management Plan for operation

IFC PS		DBSA ESSS		Applicability to the project
	avoids or minimises risks to the Affected Communities.		road safety risks, diseases and hazardous materials. • Put effective measures in place to address emergency events and avoid disasters. • Ensure that personnel and property are safe.	– Community Health and Safety Security Plan (CHSMP), including disease prevention – Community training and awareness programme – Requirements for hiring of security personnel – A framework Emergency Preparedness and Response Plan, which requires further expansion by the relevant entities – Traffic Safety Plan (as part of the occupational health and safety component)
PS5: Land acquisition and involuntary resettlement	• Avoid, and when avoidance is not possible, minimise, displacement, by exploring alternative project designs. • Avoid forced eviction. • Anticipate and avoid, or where avoidance is not possible, minimise adverse social and economic impacts from land acquisition or restrictions on land use, by: (i) providing compensation for loss of assets at replacement cost and (ii) ensuring information, consultation and the informed participation of those affected. • Improve, or restore, the livelihoods and standards of living of displaced persons. • Improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.	**ESSS5:** Development-induced displacement and resettlement	• Recognise that development-induced displacement and resettlement may specifically affect socially-vulnerable and marginalised groups, and to take this into account in implementing the ESSS. • Mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use by timeously compensating for loss of assets at replacement cost and assisting displaced persons to improve, or at least restore, their livelihoods and living standards to pre-displacement levels, or to levels prevailing prior to project implementation, whichever is higher. • Improve living conditions of poor or vulnerable persons who are physically displaced, by providing adequate housing, access to services and facilities, and security of tenure. • Conceive and execute resettlement activities as part of sustainable development programmes, providing sufficient investment resources to enable displaced persons to benefit directly from the project.	• While every effort has been made to avoid having to move people, it is likely that some structures and agricultural fields will be directly affected by the transmission line and will need to be relocated, as per the recommendations set out in the RPF, which requires a RAP to be developed and implemented. Impacts on livelihoods and access to natural resources will also be identified in order to be either avoided, or adequately compensated for. • Informed consultation and participation commenced at scoping phase, and communities are aware of the potential impacts of physical or economic displacement.

IFC PS		DBSA ESSS		Applicability to the project
			• Ensure that resettlement activities are planned and implemented with appropriate disclosure of information, meaningful consultation, and the informed participation of affected parties. • Where resettlement cannot be avoided, the developer is to treat affected parties equitably, and provide adequate compensation based on an objective assessment of the loss incurred and how it should be reimbursed.	
PS6: Biodiversity conservation and sustainable management of living natural resources	• Protect and conserve biodiversity. • Maintain the benefits from ecosystem services. • Promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.	**ESSS9:** Biodiversity conservation and sustainable living natural resource management	• Protect and conserve biodiversity, and maintain the benefits derived from ecosystem services. • Promote the sustainable management of living natural resources by adopting practices that integrate conservation needs and development priorities. • Avoid, minimise and mitigate impacts on biodiversity, and offset significant residual impacts, where appropriate, with the aim of achieving no net loss and rather a net gain, of biodiversity. • Promote sustainable management of living natural resources. • Comply with international good practice, environmental law (e.g. the United Nations Convention on Biodiversity, and international shared waters resource law), and related agreements (e.g. the Wetland Convention (RAMSAR)).	• The project will not affect 'critical habitats' and none of the floral or faunal species identified are exclusively found in the study area. However, a walk-down will seek to avoid sensitive areas and key species as far as possible. • No infestations with alien invasive plant species have been identified in the study area to date. However, a management plan is included in the ESMP (Vol. III) in this regard, should they be detected. • Impacts to ecosystem services are assessed in Section 6.3.3. These services have not been valued due to the conceptual level of design of the project. • The site corridor does not interfere with any Important Bird Areas (IBAs). However, the importance of the impacts on avifauna are recognised and assessed in Section 6.3.2, and mitigation measures are proposed.

IFC PS		DBSA ESSS		Applicability to the project
PS7: Indigenous peoples[1]	• Ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture and natural resource-based livelihoods of Indigenous Peoples. • Anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or, where avoidance is not possible, to minimise and/or compensate for such impacts. • Promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally-appropriate manner. • Establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project, throughout the project's lifecycle. • Ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present. • Respect and preserve the culture, knowledge and practices of Indigenous Peoples.	**ESSS4:** Indigenous peoples	• Assist the Proponent to ensure that the development process respects Indigenous Peoples human rights, dignity, aspirations, culture, and natural resource-based livelihoods. • Anticipate and avoid adverse project impacts on communities of Indigenous Peoples, or, when avoidance is not possible, to minimise and/or compensate for such impacts. • Undertake full FPIC with Indigenous Peoples, where projects impact on their livelihood, lands, and natural resources, in a manner cognisant of their language, customs and traditions, for any investment or development throughout the project's lifecycle. • Ensure that project implementation respects indigenous knowledge, culture and practices. • Promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally-appropriate manner. • Ensure that project implementation acknowledges Indigenous Peoples' socio-economic rights and access to services including social welfare, healthcare, education, water, electricity, housing, economic livelihoods and employment.	• The project is located within an area were Himba/Mundimba and San ethnic groups occur, which are considered to be IPs. • Efforts to avoid impact on IPs are documented in Section 6.4.1 (Socio-economic impacts), which discusses the mitigation hierarchy. • A VGP has been developed to be inclusive of the IPs and other vulnerable groups, and mitigation is inclusive for the PACs as a whole. • To ensure ICP, IPs will be consulted with regards to the proposed actions and the accepted process, and evidence must be documented in an SE Report. A preliminary approach was undertaken during the scoping phase, and ESIA disclosure will need to expand on this engagement. • Culturally-appropriate sustainable development compensation/ benefits, namely provision of water sources (boreholes and "chimpacas"), have been specified as identified by the PACs (including IPs). • Critical cultural heritage sites are considered below, as part of Cultural Heritage. • A culturally-appropriate GM is documented in the ESMP (Vol. III), and specifically in the SEP and VGP included in the ESMP (Vol. III) document.

[1] In this Performance Standard, the term "Indigenous Peoples" (IPs) is used in a generic sense to refer to a distinct social and cultural group possessing the following characteristics in varying degrees:
- Self-identification as members of a distinct indigenous cultural group, and recognition of this identity by others;
- Collective attachment to geographically-distinct habitats or ancestral territories in the project area, and to the natural resources in these habitats and territories;
- Customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture; or
- A distinct language or dialect, often different from the official language or languages of the country or region in which they reside.

IFC PS		DBSA ESSS		Applicability to the project
PS8: Cultural heritage	• Protect cultural heritage from the adverse impacts of project activities, and support its preservation. • Promote the equitable sharing of benefits derived from the use of cultural heritage.	**ESSS8:** Cultural heritage	• Protect cultural heritage from the adverse impacts of project activities, and support its preservation. • Address cultural heritage as an integral aspect of sustainable development. • Promote meaningful consultation, regarding cultural heritage, with stakeholders. • Promote the equitable sharing of benefits derived from the use of cultural heritage.	• Efforts to avoid impact on cultural heritage are documented in Section 6.4.2 with reference to the mitigation hierarchy. • Critical cultural heritage sites could include local population and IPs burial sites / graves which will need to be confirmed during a walk-down prior to construction. Community consultation is required in this regard. Such sites should be managed through a Grave Relocation Plan. • A 'chance finds procedure' is included in the ESMP (Volume III).
Cross-cutting issues		**ESSS3:** Gender mainstreaming	• Protect women's human rights and comply with international women's and human rights standards and treaties. • Increase knowledge and insights about gender and vulnerable groups (including people living with disabilities) and include this in project concepts and governance. • Identify strategies to increase women's and marginalised groups' participation and representation in sustainable infrastructure project solutions. • Adopt due diligence practices that mainstream gender considerations into project planning and execution, thereby ensuring that projects respond to distinct gender needs and proactively address gender inequalities, including men's and women's differential access to assets, property, education, credit, and other resources. • Identify and prevent potentially direct or indirect project or programme-related harm on women, men, girls and boys, including changes in livelihood, or environmental degradation and sustainability.	• The SEP and the VGP, included in the ESMP (Vol. III), document the engagements needed to be undertaken, including addressing gender issues. This will be enhanced in the ESIA disclosure phase. • The VGP includes measures to target women and ensure gender equity. The plan includes performance indicators, which are categorised by gender. • The ESMP (Vol. III) includes budgeting for mitigation to address socio-economic impacts that include VGs. • Surveys undertaken for the RAP will document demographics. including gender. • The RPF acknowledges that, in terms of compensation, the head of the household may be a woman. If it is a couple, any new agreements or titles should be in the name of both husband and wife. Consultations will therefore be inclusive and specifically cognisant of women. • The GM must be accessible to all stakeholders, regardless of gender and other characteristics.

IFC PS		DBSA ESSS		Applicability to the project
			• Incorporate sex-disaggregated data into project reporting to accurately measure and assess the impacts of investments on the different genders. • Proactively engage women and men in culturally-appropriate languages, forms and ways throughout the project lifecycle, on the basis of FPIC principles. • Provide adequate budgeting for integrating gender empowerment into project execution plans.	

Annexure D: Reply from concerned Authorities

REPÚBLICA DE ANGOLA
FORÇAS ARMADAS ANGOLANAS
FORÇA AÉREA NACIONAL
GABINETE DO COMANDANTE

Para:
Rede Nacional de Transporte de Electricidade – RNT, E.P.

L U A N D A

Luanda, aos 30 de Setembro de 2019.

1338 /GAB.CMDTE/FAN/19.02

ASSUNTO: **LIGAÇÃO DE REDES ELÉCTRICAS ANGOLA E NAMÍBIA.**

O Comando da Força Aérea Nacional apresenta os seus melhores cumprimentos e aproveita a ocasião para enfatizar que acusou a receção do Vosso Ofício nº 2369/28-ADM-P-RNT/2019, de 23 de Setembro do corrente ano que, informa sobre a linha de interligação eléctrica em estudo, que passará por uma distância de 6 km da cabeceira da pista do aeroporto militar da Cahama.

Relativamente ao assunto em apreço, não se vislumbra qualquer inconveniênte para efectivação do referido projecto, referenciado no estudo, pois, pela trajectória mencionada, não constitui qualquer risco a navegação aérea no Aeródromo da Cahama, numa distância que separa a linha da cabeceira da pista.

Nestes termos,

Alta Estima e Consideração.

Altino Carlos José dos Santos
General
Comandante da Força Aérea Nacional

FORÇAS ARMADAS ANGOLANAS
Força Aérea Nacional

RUA: AUGUSTO TADEU DE BASTOS-EX. 5 DE OUTUBRO - BAIRRO DA MAIANGA - TELEFONE: 222 392 584 - FAX: 222 372 273
LUANDA/ANGOLA

GPC - 3817 ADM- PGP -614 - DPS - 148 DEP - 543

LEBI INTELIGENTE/2019

Annexure E: Biotic environment – supporting tables

Table E.1: Tree and shrub diversity known and/or expected to occur in the general area – i.e. between the Lubango Substation and the Cunene River areas (southwest Angola and northwest Namibia).

These are derived from Mannheimer and Curtis (2018). Species indicated below are know from the quarter-degree square distribution principle used and don't necessarily occur throughout the entire area. Namibian conservation & legal status included for comparative purposes.

Species: Scientific name	Angolan conservation and legal status	Expected	Namibian conservation and legal status	Mannheimer and Curtis (2018)	International Status: IUCN
Acacia arenaria		√		√	
Acacia ataxacantha		√		√	
Acacia erioloba		√	Protected (F)	√	
Acacia erubescens		√		√	
Acacia fleckii		√		√	
Acacia hebeclada subsp. *tristis*		√		√	
Acacia karroo		√		√	
Acacia kirkii		√		√	
Acacia mellifera subsp. *detinens/mellifera*		√		√	
Acacia nilotica		√		√	
Acacia reficiens		√		√	
Acacia senegal		√		√	
Acacia sieberiana		√	Protected (F)	√	
Acacia tortilis		√		√	
Adansonia digitata	V	√	Protected (F)	√	
Adenia pechuelii		√	End	√	LC
Adenium boehmianum		√	Protected (F)	√	
Adenolobus pechuelii		√		√	
Albizia anthelmintica		√	Protected (F)	√	
Albizia brevifolia		√		√	
Albizia tanganyicensis		√		√	
Aloe litoralis		√	NC; C2	√	
Baikiaea plurijuga		√	Protected (F)	√	NT
Balanites angolensis		√	N-end	√	
Baphia massaiensis		√		√	
Bauhinia petersiana		√		√	
Berchemia discolor		√	Protected (F)	√	
Boscia albitrunca		√	Protected (F)	√	
Boscia foetida		√		√	
Boscia microphylla		√		√	
Boscia mossambicensis		√		√	
Cassia abbreviata		√		√	

Species: Scientific name	Angolan conservation and legal status	Expected	Namibian conservation and legal status	Mannheimer and Curtis (2018)	International Status: IUCN
Catophractes alexandri		√		√	
Ceraria longipedunculata		√	N-end	√	
Cissus nymphaeifolia		√		√	
Clerodendrum glabrum		√		√	
Colophospermum mopane		√	Protected (F)	√	
Combretum apiculatum		√		√	
Combretum celastroides		√		√	
Combretum collinum		√		√	
Combretum engleri		√		√	
Combretum hereroense		√		√	
Combretum mossambicense		√		√	
Combretum imberbe		√	Protected (F)	√	
Combretum oxystachyum		√		√	
Combretum wattii		√		√	
Combretum zeyheri		√		√	
Commiphora africana		√		√	
Commiphora angolensis		√		√	
Commiphora crenato-serrata		√	N-end	√	
Commiphora dinteri			End; Protected (F)	√	
Commiphora discolor		√	N-end	√	
Commiphora glandulosa		√		√	
Commiphora glaucescens		√	N-end	√	
Commiphora mollis		√		√	
Commiphora multijuga		√	N-end	√	
Commiphora oblanceolata		√	N-end; Protected (F)	√	
Commiphora pyracanthoides		√		√	
Commiphora tenuipetiolata		√		√	
Commiphora virgata			End; Protected (F)	√	
Cordia sinensis		√		√	
Croton gratissimus		√		√	
Croton menyharthii		√		√	
Dichrostachys cinerea		√		√	
Diospyros mespiliformis	V	√	Protected (F)	√	
Diplorhynchus condylocarpon		√		√	
Dombeya rotundifolia		√		√	
Ehretia alba		√		√	
Ehretia namibiensis		√		√	
Elaeodendron transvaalense		√	Protected (F)	√	

Species: Scientific name	Angolan conservation and legal status	Expected	Namibian conservation and legal status	Mannheimer and Curtis (2018)	International Status: IUCN
Elephantorrhiza suffruticosa		√		√	
Entandrophragma spicatum		√	Protected (F)	√	
Euclea divinorum		√		√	
Euclea pseudebenus		√	Protected (F)	√	
Euclea undulata		√		√	
Euphorbia eduardoi		√	C2; N-end	√	
Euphorbia guerichiana		√	C2	√	
Faidherbia albida		√	Protected (F)	√	
Ficus berkei/F. petersii		√	Protected (F)	√	
Ficus capreifolia		√		√	
Ficus cordata		√	Protected (F)	√	
Ficus glumosa		√		√	
Ficus ilicina		√		√	
Ficus sycomorus		√	Protected (F)	√	
Flueggea virosa		√		√	
Fockea multiflora		√		√	
Gardenia volkensii		√		√	
Grevia avellana		√		√	
Grewia bicolor		√		√	
Grewia falcistipula		√		√	
Grewia flava		√		√	
Grewia flavescens		√		√	
Grewia olukondae		√		√	
Grewia retinervis		√		√	
Grewia schinzii		√		√	
Grewia subspathulata		√		√	
Grewia tenax		√		√	
Grewia villosa		√		√	
Gossypium anomalum		√		√	
Gossypium triphyllum		√		√	
Gymnosporia senegalensis		√		√	
Hexalobus monopetalus		√		√	
Hyphaene petersiana		√	Forestry (F)	√	LC
Ipomoea adenioides		√		√	
Kirkia acuminata		√		√	
Laggera decurrens		√		√	
Maerua schinzii		√	Protected (F)	√	
Manilkara mochisia		√		√	

Species: Scientific name	Angolan conservation and legal status	Expected	Namibian conservation and legal status	Mannheimer and Curtis (2018)	International Status: IUCN
Mimosa pigra		√		√	
Montinia caryophyllacea		√		√	
Moringa ovalifolia		√	N-end; Protected (F); NC	√	
Mundulea sericea		√		√	
Nuxia oppostifolia		√		√	
Obetia carruthersiana		√	N-end	√	
Opilia campestris		√		√	
Ormocarpum kirkii		√		√	
Ozoroa crassinervia		√		√	
Ozoroa insignis		√		√	
Ozoroa paniculosa		√		√	
Ozoroa schinzii		√	N-end	√	
Pachypodium lealii		√	Protected (F); N-end; NC	√	
Pavetta schumanniana		√		√	
Pavetta zeyheri		√		√	
Peltophorum africanum		√		√	
Philenoptera nelsii		√		√	
Pseudolachnostylis maprouneifolia		√		√	
Ptaeroxylon obliquum		√		√	
Pterocarpus lucens		√		√	
Pterocarpus rotundifolius		√		√	
Rhigozum brevispinosum		√		√	
Rhigozum virgatum		√	N-end	√	
Salix mucronata subsp. *mucronata*		√	NC; C2	√	
Salvadora persica		√		√	
Sclerocarya birrea		√	Protected (F)	√	
Securidaca longepedunculata		√		√	
Searsia pyroides		√		√	
Searsia quartiniana		√		√	
Sesamothamnus leistneri			End	√	
Sesbania sesban		√		√	
Spirostachys africana		√	Protected (F)	√	
Steganotaenia araliacea		√		√	
Sterculia africana		√	Protected (F)	√	
Sterculia quinqueloba		√	Protected (F)	√	
Strophanthus amboensis		√	N-end	√	
Tamarix usneoides		√	Protected (F)	√	
Terminalia prunioides		√		√	

Species: Scientific name	Angolan conservation and legal status	Expected	Namibian conservation and legal status	Mannheimer and Curtis (2018)	International Status: IUCN
Terminalia sericea		√		√	
Tinnea rhodesiana		√		√	
Vangueria cyanescens		√		√	
Vangueria infausta		√		√	
Vernonia cinerascens		√		√	
Ximenia americana		√		√	
Ximenia caffra		√		√	
Ziziphus mucronata		√	Protected (F)	√	

End = Endemic; N-end = Near Endemic (Craven 1999, Mannheimer and Curtis 2018)
C2 = CITES Appendix 1 or 2 species
IUCN (2019): NT = Near Threatened; LC = Least concern
Angolan legislation - Executive Decree no. 252/18 of 13 July, that approves the Red List of Species for Angola:
V = Vulnerable
Namibian legislation
F = Forest Act No. 12 of 2001
NC = Nature Conservation Ordinance No. 4 of 1975

Table E.2: Dominant larger tree and shrub species confirmed at various sites – i.e. between the Lubango Substation and the Cunene River areas (southwest Angola and northwest Namibia).

See ESIA report for examples of some unique tree species and habitats encountered along the ANNA route.

Area	Coordinates	Vegetation Type	Habitat	Dominant tree/shrub spp.	Large specimens	Status: Angola	Status: IUCN	Invasive alien spp.
Lubango Substation	14°48'09.4"S; 13°42'03.4"E	Zambezian	Degraded farmland	*Acacia ataxacantha*				
				Aloe litoralis				
				Burkea africana				
				Combretum collinum				
				Combretum celastroides				
				Diospyros mespiliformis		V		
				Peltophorum africanum				
				Philenoptera nelsii	Δ			
				Searsia tenuinervis				
				Ziziphus mucronata				
Lubango area	14°47'55.6"S; 13°45'33.5"E	Zambezian	Degraded farmland	*Acacia ataxacantha*				*Opuntia* spp.
			Ephemeral drainage line	*Aloe litoralis*				*Sisal* spp.
			Erosion gully	*Burkea africana*	Δ			
				Cussonia spp.	Δ			
				Diospyros mespiliformis	Δ	V		
				Ficus sycomorus	Δ			
				Peltophorum africanum	Δ			
				Philenoptera nelsii	Δ			
Chibia area	15°05'57.1"S; 14°03'07.0"E	Zambezian mix	Degraded farmland	*Acacia ataxacantha*				
				Acacia nilotica				
				Burkea africana	Δ			
				Combretum collinum	Δ			
				Combretum celastroides				

Area	Coordinates	Vegetation Type	Habitat	Dominant tree/shrub spp.	Large specimens	Status: Angola	Status: IUCN	Invasive alien spp.
				Combretum hereoensis				
				Combretum zeyheri				
				Croton gratissimus				
				Elephantorrhiza suffruticosa				
				Ficus cordata				
				Peltophorum africanum				
				Philenoptera nelsii	Δ			
				Piliostigma thonningii				
				Pterocarpus angolensis	Δ	V		
				Searsia tenuinervis				
				Searsia spp.				
				Terminalia sericea				
				Ziziphus mucronata				
Chibia area	15°08'45.7"S; 14°03'20.1"E	Zambezian mix	Granite hills	*Burkea africana*	Δ			
				Ficus cordata	Δ			
				Pterocarpus angolensis	Δ	V	LC	
				Sterculia africana	Δ			
				Steganotaenia araliacea	Δ			
Chibia area	15°10'17.4"S; 14°06'56.4"E	Zambezian mix	Granite hills	*Acacia ataxacantha*				
			Degraded farmland	*Acacia galpini*				
			Granite quarry	*Baphia massaiensis*				
				Boscia albitrunca				
				Combretum collinum				
				Croton gratissimus				
				Mundulea sericea				
				Piliostigma thonningii				

Area	Coordinates	Vegetation Type	Habitat	Dominant tree/shrub spp.	Large specimens	Status: Angola	Status: IUCN	Invasive alien spp.
				Pterocarpus angolensis	Δ	V	LC	
				Ziziphus mucronata				
Chibia area	15°11'09.1"S; 14°07'52.4"E	Zambezian mix	Floodplain area	*Ficus sycomorus*	Δ			*Ricinus communis*
Shimbolembo area	15°26'03.4"S; 14°13'38.5"E	Zambezian mix	Degraded farmland	*Acacia ataxacantha*				
				Baphia massaiensis				
				Baikiaea plurijuga	Δ		NT	
				Croton gratissimus				
				Grewia retinervis				
				Pterocarpus angolensis		V	LC	
				Schinziophyton rautanenii				
				Securidaca longepedunculata				
				Terminalia sericea				
Shimbolembo area	15°27'53.3"S; 14°15'42.8"E	Zambezian mix	Degraded farmland	*Acacia erioloba*	Δ			*Opuntia* spp.
				Acacia tortilis	Δ			*Ricinus communis*
				Baikiaea plurijuga	Δ		NT	
				Peltophorum africanum	Δ			
				Terminalia sericea	Δ			
Shimbolembo area	15°30'05.8"S; 14°16'06.6"E	Zambezian mix	Degraded farmland	*Acacia tortilis*				
			Drainage line	*Faidherbia albida*	Δ			
			Pan system	*Terminalia sericea*				
Shimbolembo area	15°30'10.4"S; 14°14'07.6"E	Zambezian mix	Degraded farmland	*Acacia ataxacantha*				*Opuntia* spp.
				Baphia massaiensis				
				Baikiaea plurijuga	Δ		NT	
				Combretum celastroides				
				Croton gratissimus				

Area	Coordinates	Vegetation Type	Habitat	Dominant tree/shrub spp.	Large specimens	Status: Angola	Status: IUCN	Invasive alien spp.
				Commiphora angolensis				
				Grewia flawa				
Cahama area	15°58'39.7"S; 14°07'59.1"E	Zambezian mix	Degraded farmland	*Acacia ataxacantha*				*Opuntia* spp.
			Pan system	*Acacia erioloba*				
			Caculuvar River drainage system	*Acacia erubescens*				
				Acacia nilotica				
				Aloe zebrina				
				Baphia massaiensis				
				Baikiaea plurijuga	Δ		NT	
				Boscia albitrunca				
				Combretum collinum				
				Combretum engleri				
				Combretum zeyheri				
				Colophospermum mopane				
				Commiphora mollis				
				Croton gratissimus				
				Dichrostachys cinerea				
				Grewia flava				
				Peltophorum africanum				
				Philenoptera nelsii				
				Schinziophyton rautanenii	Δ			
				Terminalia sericea				
				Ximenia americana				
Cahama area	16°11'08.4"S; 14°16'52.5"E	Zambezian mix	Degraded farmland	*Acacia ataxacantha*				
			Pan system	*Acacia erioloba*	Δ			
			Caculuvar River drainage system	*Acacia erubescens*				

Area	Coordinates	Vegetation Type	Habitat	Dominant tree/shrub spp.	Large specimens	Status: Angola	Status: IUCN	Invasive alien spp.
				Baphia massaiensis				
				Baikiaea plurijuga			NT	
				Burkea africana				
				Combretum collinum				
				Dichrostachys cinerea				
				Faidherbia albida				
				Grewia flava				
				Grewia flavescens				
				Ochna pulcra				
				Peltophorum africanum				
				Rhigozum brevispinosum				
				Searsia marlothi				
				Terminalia sericea				
				Vangueria infausta				
				Ximenia americana				
				Ziziphus mucronata				
Cahama Substation	16°19'34.2"S; 14°17'19.1"E	Zambezian and Mopane mix	Degraded farmland	*Acacia ataxacantha*				*Euphorbia tirucalli*
				Baikiaea plurijuga	Δ		NT	
				Boscia albitrunca				
				Colophospermum mopane	Δ			
				Commiphora mollis				
				Croton gratissimus	Δ			
				Dichrostachys cinerea				
				Diospyros mespiliformis		V		
				Fockea multiflora				
				Grewia bicolor				
				Grewia flavescens				

Area	Coordinates	Vegetation Type	Habitat	Dominant tree/shrub spp.	Large specimens	Status: Angola	Status: IUCN	Invasive alien spp.
				Mundulia sericea				
				Ximenia americana				
Cahama area	16°20'50.1"S; 14°15'02.3"E	Acacia and Mopane mix	Drainage line	*Acacia tortilis*	Δ			*Datura inoxia*
				Adansonia digitata	Δ	V		
				Combretum imberbe	Δ			
				Ficus sycomorus	Δ			
Calovango area	16°20'57.4"S; 14°17'58.0"E	Mopane mix	Drainage line	*Colophospermum mopane*	Δ			
				Terminalia prunioides	Δ			
Calovango area	16°27'46.8"S; 14°19'18.2"E	Mopane mix	Drainage line	*Acacia tortilis*	Δ			*Datura inoxia*
				Colophospermum mopane	Δ			
				Combretum imberbe	Δ			
				Faidherbia albida	Δ			
Techipa area	16°48'59.7"S; 14°26'11.9"E	Mopane mix	Mopane woodland	*Colophospermum mopane*	Δ			
			Pan system	*Terminalia prunioides*				
Techipa area	16°59'25.7"S; 14°23'52.0"E	Zambezian and Mopane mix	Mopane woodland	*Baikiaea plurijuga*	Δ		NT	
			Pan system	*Colophospermum mopane*	Δ			
				Combretum apiculatum				
				Combretum collinum	Δ			
				Grewia bicolor				
				Terminalia sericea	Δ			
Techipa area	17°00'46.6"S; 14°25'39.7"E	Mopane mix	Mopane shrubland	*Colophospermum mopane*				
			Pan system					
Techipa area	17°02'01.6"S; 14°25'39.7"E	Mopane mix	Mopane shrubland	*Colophospermum mopane*				
			Pan system					

Area	Coordinates	Vegetation Type	Habitat	Dominant tree/shrub spp.	Large specimens	Status: Angola	Status: IUCN	Invasive alien spp.
Calueque area	17°06'30.1"S; 14°27'09.0"E	Mopane mix	Mopane woodland	*Acacia mellifera*				
				Colophospermum mopane	Δ			
				Hyphaene petersiana	Δ		LC	
				Terminalia prunioides	Δ			
Ruacana area	17°18'38.4"S; 14°20'02.0"E	Mopane mix	Mopane woodland	*Acacia arenaria*				
				Adansonia digitata	Δ	V		
				Adenium boehmianum				
				Colophospermum mopane	Δ			
				Combretum apiculatum				
				Commiphora angolensis				
				Commiphora mollis				
				Commiphora multijuga				
				Faidherbia albida				
				Grewia bicolor				
				Kirkia acuminata	Δ			
				Rhigozum brevispinosum				
				Sclerocarya birrea	Δ			
				Sterculia africana	Δ			
				Terminalia prunioides				
				Ximenia americana				

IUCN (2019): NT = Near Threatened; LC = Least Concern
Angolan legislation - Executive Decree no. 252/18 of 13 July, that approves the Red List of Species for Angola:
V = Vulnerable

Table E.3: Grass diversity known and/or expected to occur in the general area – i.e. between the Lubango Substation and the Cunene River areas (southwest Angola and northwest Namibia).

These are derived from [1]Müller (1984), [2]Van Oudtshoorn (1999), [3]Burke (2005) and [4]Müller (2007). Species indicated below are know from the quarter-degree square distribution principle used and don't necessarily occur throughout the entire area.

Species: Scientific name	Status	Ecological Status	Grazing Value
[1,2,4]*Anthephora pubescens*		Decreaser	High
[1]*Anthephora ramosa*		?	High
[1,4]*Anthephora schinzii*		?	Low
[2,4]*Aristida adscensionis*		Increaser 2	Low
[1,4]*Aristida effusa*		?	Low
[2]*Aristida rhiniochloa*		Increaser 2	Low
[1,2,4]*Brachiaria deflexa*		Increaser 2	Average
[1,4]*Brachiaria glomerata*		?	Average
[1,2,3,4]*Cenchrus ciliaris*		Decreaser	High
[2,3]*Centropodia glauca*		Decreaser	High
[2,4]*Chloris virgata*		Increaser 2	Average
[2,4]*Cynodon dactylon*		Increaser 2	High
[4]*Dactyloctenium aegyptium*		Increaser 2	Average
[1,4]*Danthoniopsis dinteri*		?	Low
[1,4]*Danthoniopsis ramosa*		?	Average
[4]*Echinochloa colona*		Increaser 2	High
[2,4]*Enneapogon cenchroides*		Increaser 2	Average
[1,2,3,4]*Enneapogon desvauxii*		Intermediate	Average
[1,2,4]*Enneapogon scaber*		?	Low
[1,2,3,4]*Enneapogon scoparius*		Increaser 3	Low
[4]*Entoplocamia aristulata*		?	Average
[1,4]*Eragrostis annulata*		?	Low
[2]*Eragrostis cilianensis*		Increaser 2	Low
[1,4]*Eragrostis echinochloidea*		Increaser 2	Average
[1,2,3,4]*Eragrostis nindensis*		Increaser 2	Average
[1,4]*Eragrostis porosa*		Increaser 2	Low
[1,2,4]*Eragrostis rotifer*		?	Average
[2]*Eragrostis superba*		Increaser 2	Average
[1,2,3,4]*Fingerhuthia africana*		Decreaser	Average
[2,4]*Melinis repens*		Increaser 2	Low
[1,4]*Monelytrum leuderitzianum*		?	Low
[2]*Oropetium capense*		Increaser 2	Low
[4]*Panicum lanipes*		?	High

Species: Scientific name	Status	Ecological Status	Grazing Value
[2]*Panicum maximum*		Decreaser	High
[2]*Panicum repens*		Decreaser	High
[1,4]*Pennisetum foermeranum*	End	?	Low
[2]*Polypogon monspeliensis*		Exotic	Average
[1]*Rhynchelytrum villosum*		Increaser 2	Average
[1,2,3,4]*Schmidtia kalahariensis*		Increaser 2	Low
[2]*Schmidtia pappophoroides*		Decreaser	High
[1,4]*Setaria appendiculata*		?	Average
[4]*Setaria finita*	End	?	Low
[2,4]*Setaria verticillata*		Increaser 2	Average
[2]*Sporobolus festivus*		Increaser 2	Low
[4]*Sporobolus ioclados*		Increaser 2	Average
[1,2,3,4]*Stipagrostis ciliata*		Decreaser	High
[3,4]*Stipagrostis damarensis*	End	?	Average
[4]*Stipagrostis dinteri*		?	Average
[4]*Stipagrostis giessii*		?	Average
[1,2,4]*Stipagrostis hirtigluma*		Increaser 2	Low
[1,3,4]*Stipagrostis hochstetteriana*		Decreaser	Low
[4]*Stipagrostis namaquensis*		?	Average
[3]*Stipagrostis sabulicola*	End	?	?
[1,2,4]*Stipagrostis obtusa*		Decreaser	High
[1,2,3,4]*Stipagrostis uniplumis*		Increaser 2	Average
[1,2,4]*Tricholaena monachne*		Increaser 2	Low
[4]*Triraphis purpurea*		Increaser 1	Low
[1,4]*Triraphis ramosissima*		?	High

End = Endemic (Burke 2005 and Müller 2007)
? – not classified in literature, but often similar to other species within the genus

Table E.4: Reptile diversity known and/or expected to occur in the general area – i.e. between the proposed Lubango Substation and the Cunene River areas (southwest Angola and northwest Namibia).

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International status		
						SARDB	IUCN	CITES
TURTLES AND TERRAPINS								
Stigmochelys pardalis	Leopard Tortoise	V; Per; PG	√		√		LC	C2
Kinixys belliana	Bells' Hinge-back Tortoise	-		V	√			
Pelomedusa subrufa	Marsh/HelMEed Terrapin	Secure	√		√			
Pelusios nanus	African Dwarf Mud Turtle	-			√			
SNAKES								
Beaked Blind Snakes								
Afrotyphlops schlegelii (Rhinotyphlops schlegelii petersii)	Schlegel's Beaked Blind Snake	Secure	√		√			
Thread Snakes								
Leptotyphlops occidentalis	Western Thread Snake	End; Secure	√			Per		
Leptotyphlops scutifrons	Peters' Thread Snake	-			√			
Namibiana (Leptotyphlops) labialis	Damara Thread Snake	End; Secure	√					
Namibiana rostrata	Angolan Beaked Thread Snake	-		End				
Pythons								
Python anchietae	Anchieta's Dwarf Python	End; I-kn; PG	√				LC	C2
Python natalensis	Southern African Python	V; Per; PG	√		√	V		C2
Burrowing Asp								
Atractaspis bibronii	Southern or Bibron's Burrowing Asp	Secure	√					
Purple-glossed Snakes								
Amblyodipsas polylepis	Common Purple-glossed Snake	-			√			
Quill Snouted Snakes								
Xenocalamus bicolour bicolor	Bicoloured Quill-snouted Snake	Secure	√					
Typical Snakes								
Aparallactus capensis	Cape Centipede Eater	-			√		LC	
Boaedon angolensis	Angolan House Snake	-		End	√			
Boaedon (Lamprophis) fuliginosus	Brown House Snake	Secure	√		√			
Lycophidion hellmichi	Hellmich's or Koakoveld Wolf Snake	I-kn; R?	√				DD	
Lycophidion multimaculatum	Spotted Wolf Snake	-			√			
Gonionotophis (Mehelya) vernayi	Angola File Snake	I-kn; R?	√					
Hemirhagerrhis viperina	Western Bark Snake	-			√			
Prosymna angolensis	Angola Shovel-snout	-			√		LC	
Prosymna visseri	Visser's Shovel-snout	-			√			
Pseudaspis cana	Mole Snake	Secure	√					

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International status		
						SARDB	IUCN	CITES
Dipsina multimaculata	Dwarf Beaked Snake	End; Secure	√					
Psammophis angolensis	Dwarf Sand Snake	-			√			
Psammophis trigrammus	Western Sand Snake	End; Secure	√					
Psammophis subtaeniatus	Stripe-bellied Sand Snake	Secure	√		√		LC	
Psammophis brevirostris leopardinus	Leopard and Short-snouted Grass Snakes	Secure	√					
Philothamnus angolensis	Angolan Green Snake	-			√			
Philothamnus semivariegatus	Spotted Bush Snake	Secure	√		√			
Psammophylax rhombeatus ocellatus	Spotted Skaapsteker	-		End	√			
Psammophylax tritaeniatus	Striped Skaapsteker	-			√		LC	
Dendroaspis polylepsis	Black Mamba	-			√			
Elapsoidea semiannulata semiannulata	Angolan Garter Snake	-			√			
Thelotornis capensis oatesi	Oates' Twig Snake	-			√		LC	
Dasypeltis scabra	Common/Rhombic Egg Eater	Secure	√		√		LC	
Aspidelaps lubricus cowlesi	Coral Snake	Secure	√					
Naya (annulifera) anchietae	Snouted Cobra	Secure	√		√			
Naya nigricincta	Black-necked Spitting Cobra	End; Secure	√		√	R		
Crotaphopeltis hotamboeia	Red-lipped Snake	-			√			
Dipholidus typus typus	Boomslang	-			√			
Bitis arietans	Puff Adder	Secure	√		√			
Bitis caudalis	Horned Adder	Secure	√					
Causus belineatus	Two-striped Night Adder	-			√			
Causus rhombeatus	Rhombic Night Adder	-			√			
Worm Lizard								
Monopeltis anchietae	Anchieta's Spade-snouted Worm Lizard	Secure	√		√		LC	
Monopeltis infuscata	Infuscate Wedge-snouted Worm Lizard	-			√			
LIZARDS								
Savannah Burrowing Skinks								
Sepsina alberti	Albert's Burrowing Skink	End; Secure	√				LC	
Sepsina angolensis	Angolan Reduced-limb Skink	-			√			
Advanced Skinks								
Mochlus (Lygosoma) sundevallii	Sundevall's Writhing Skink	Secure	√		√		LC	
Trachylepis acutilabris	Wedge-snouted Skink	Secure	√					
Trachylepis albopunctata	Angolan Variable Skink	-			√			

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International status		
						SARDB	IUCN	CITES
Trachylepis binotata	Ovambo Tree Skink	Secure	√					
Trachylepis chimbana	Chimba Skink	-			√			
Trachylepis hoeschi	Hoesch's Skink	End; Secure	√					
Trachylepis lacertiformis	Bronze Rock Skink	-			√		LC	
Trachylepis laevis	Angolan Blue-tailed Skink	Secure	√					
Trachylepis spilogaster	Kalahari Tree Skink	End; Secure	√					
Trachylepis striata wahlbergi	Striped Skink	Secure	√		√			
Trachylepis sulcata sulcata	Western Rock Skink	Secure	√					
Trachylepis variegata punctulata	Variegated Skink	Secure	√					
Old World Lizards								
Heliobolus lugubris	Bushveld Lizard	Secure	√		√			
Ichnotropis bivittata bivittata	Angolan Rough-scaled Lizard	-			√			
Nucras intertexta	Spotted Sandveld Lizard	End; Secure	√					
Nucras tessellata	Western Sandveld Lizard	-			√			
Pedioplanis benguellensis	Bacage's Sand Lizard	-			√			
Pedioplanis breviceps	Short-headed Sand Lizard	End; Secure	√					
Pedioplanis namaquensis	Namaqua Sand Lizard	Secure	√					
Pedioplanis undata	Western Sand Lizard	End; Secure	√					
Pedioplanis gaerdesi	Kaokovled Sand Lizard	End; Secure	√				LC	
Meroles squamulosus	Common Rough-scaled Lizard	-			√			
Plated Lizards								
Cordylosaurus subtessellatus	Dwarf Plated Lizard	End; Secure	√				LC	
Gerrhosaurus multilineatus	Kalahari Plated Lizard	Secure	√					
Gerrhosaurus nigrolineatus	Black-lined Plated Lizard	Secure	√		√			
Gerrhosaurus validus maltzahni	Giant Plated Lizard	Secure	√					
Girdled Lizards								
Cordylus machadoi	Machodoe's Girdled Lizard	I-kn	√		√			C2
Monitors								
Varanus niloticus	Nile Monitor	V; Per; PG	√		√			C2
Varanus albigularis	Rock or White-throated Monitor	V; Per; PG	√		√	S to V		C2
Agama								
Agama aculeata	Ground Agama	Secure	√		√			
Agama anchietae	Anchietae's Agama	Secure	√					
Agama etoshae	Etosha Agama	End; Secure	√					
Agama planiceps	Namibian Rock Agama	End; Secure	√		√*			
Acanthocercus Sp.		-			√			
Tree Agamas								

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International status		
						SARDB	IUCN	CITES
Acanthocerus atricollis	Tree Agama	I-kn; R?	√					
Chameleons								
Chamaeleo dilepis	Flap-necked Chameleon	Secure	√		√		LC	C2
Chamaeleo namaquensis	Namaqua Chameleon	Secure	√				LC	C2
Geckos								
Afroedura cf. bogerti	Angola Flat Gecko	R	√					
Colopus wahlbergii	Kalahari Ground Gecko	End; Secure	√					
Hemidactylus longicephalus	Long-headed Tropical House Gecko	R	√					
Lygodactylus bradfieldi	Bradfield's Dwarf Gecko	End; Secure	√					
Lygodactylus lawrencei	Lawrence's Dwarf Gecko	End; Secure	√					
Pachydactylus bicolor	Velvety Thick-toed Gecko	End; Secure	√					
Pachydactylus capensis	Cape Thick-toed Gecko	End; Secure	√					
Pachydactylus caraculicus	Angolan Banded Thick-toed Gecko	Secure	√					
Chondrodactylus (Pachydactylus) turneri	Turner's Thick-toed Gecko	Secure	√					
Chondrodactylus laevigatus	Button-scaled Gecko	-			√			
Pacydactylus fitzsimonsi	FitzSimons' Thick-toed Gecko	End; Secure	√		√			
Pachydactylus oreophilus	Kaokoveld Thick-toed Gecko	End; Secure	√					
Pachydactylus punctatus	Speckled Thick-toed Gecko	Secure	√		√			
Pachydactylus scherzi	Scherz's Thick-toed Gecko	-			√			
Pachydactylus scutatus	Large-scaled Thick-toed Gecko	End; Secure	√					
Rhoptropus barnardi	Barnard's Namib Day Gecko	End; Secure	√		√			
Rhoptropus boultoni	Boulton's Namib Day Gecko	End; Secure	√					
Crocodiles								
Crocodylus niloticus	Nile Crocodile	Per; PG	√	V; Protected from hunting	√	V	LC	C1

Namibian conservation and legal status according to the Namibian Conservation Ordinance No. 4 of 1975 (Griffin 2003)
End = Endemic [Endemic include endemic species to South Africa (Branch 1998)]; R? = Rare (expected); V = Vulnerable; I-kn = Insufficiently Known; Per = Peripheral; PG = Protected Game
Endemic (Angola) = Marques et al. (2018)
Protected from hunting (Angola) = It is illegal to hunt 4 reptile species in Angola (e.g. turtles and crocodile) (de Queiroz et al. 2008).
IUCN (2019) – International Union for the Conservation of Nature and Natural Resources [All species not listed by the IUCN (2019) have not yet been assessed for the IUCN Red List]. DD = Data Deficient; LC = Least Concern
SARDB (2004) – South African Red Data Book; R = Rare; V = Vulnerable; S to V = Safe to Vulnerable; Per = Peripheral
CITES – Convention on International Trade in Endangered Species of Wild Fauna and Flora C1 or C2 = CITES Appendix 1 or 2 species.
Angolan legislation - Executive Decree no. 252/18 of 13 July, that approves the Red List of Species for Angola: V = Vulnerable
√* - Although not according to the literature it was observed serendipitously by the author at the Caculuvar River.

Source for literature review: Alderton (2009), Alexander and Marais (2007), Anon (2019), Branch (1998), Branch (2008), Boycott and Bourquin 2000, Broadley (1983), Buys and Buys (1983), Cunningham (2006), de Queiroz et al. (2008), Griffin (1998a), Griffin (2003), Hebbard (n.d.), Marais (1992), Marques et al. (2018), Tolley and Burger (2007)

Table E.5: Amphibian diversity known and/or expected to occur in the general area – i.e. between the proposed Lubango Substation and the Cunene River areas (southwest Angola and northwest Namibia).

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International Status: IUCN
Toads						
Sclerophrys (Amietophrynus) gutturalis	Guttural Toad		√			LC
Sclerophrys (Amietophrynus) maculata	Flat-backed Toad		√			LC
Sclerophrys (Amietophrynus) poweri	Western Olive Toad		√			LC
Sclerophrys garmani humbensis	Garman's Toad				√	LC
Sclerophrys regularis	African Common Toad				√	LC
Mertensophryne aff. *mocquardi*	Mocquard's Toad				√	DD
Pygmy Toads						
Poyntonophrynus damaranus	Damaraland Pygmy Toad	End	√			DD
Poyntonophrynus dombensis	Dombe Pygmy Toad	End	√			LC
Kassinas						
Kassina senegalensis	Bubbling Kassina		√		√	LC
Rubber Frog						
Phrynomantis annectens	Marbled Rubber Frog	End	√			LC
Phrynomantis bifasciatus	Banded Rubber Frog				√	LC
Puddle Frog						
Phrynobatrachus mababiensis	Dwarf Puddle Frog		√		√	LC
Phrynobatrachus natalensis	Snoring Puddle Frog		√		√	LC
Phrynobatrachus cryptotis	Cryptic River Frog				√	DD
Ornate Frogs						
Hildebrandtia ornata	Ornate Frog		√		√	LC
Hildebrandtia ornatissima	Angola Ornate Frog			End	√	DD
Sand Frogs						
Tomopterna krugerensis	Knocking Sand Frog		√			LC
Tomopterna tandyi	Tandy's Sand Frog		√			LC
Tomopterna tuberculosa	Beaded Sand Frog		√			LC
Tomopterna cryptotis	Tremelo Sand Frog				√	LC
Bullfrogs						
Pyxicephalus adspersus	Giant Bullfrog	NT	√			LC
Pyxicephalus edulis	Edible Bullfrog				√	LC
Platannas						
Xenopus laevis	Common Platanna		√			LC
Xenopus petersii	Peter's Platanna		√		√	LC
Reed Frogs						

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International Status: IUCN
Hyperolius angolensis	Angolan Reed Frog				√	
Hyperolius bocagei	Bocage's Reed Frog				√	LC

End = Endemic (Griffin 1998b)
IUCN (2019): DD = Data Deficient; LC = Least Concern
NT = Near Threatened (Du Preez and Carruthers 2009)
Endemic (Angola) = Marques et al. (2018)
Source for literature review: Carruthers (2001), Channing (2001), Channing and Griffin (1993), Du Preez and Carruthers (2009), Griffin (1998b), IUCN (2019), Marques et al. (2018), Passmore and Carruthers (1995)

Table E.6: Mammal diversity known and/or expected to occur in the general area – i.e. between the Lubango Substation and the Cunene River areas (southwest Angola and northwest Namibia).

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International Status		
						SARDB	IUCN	CITES
Elephant Shrews								
Elephantulus intufi	Bushveld Elephant-shrew	Secure	√		√	DD		
Aardvark								
Orycteropus afer	Aardvark	Secure; PG	√	V	√			
Shrews								
Crocidura cyanea	Reddish-grey Musk Shrew	Secure	√		√	DD		
Crocidura hirta	Lesser Red Musk Shrew	Secure	√		√	DD		
Hyrax								
Procavia capensis	Rock Hyrax	Secure; Prob A	√		√			
Heterohyrax brucei	Yellow-spotted Rock Hyrax	-			√			
Elephant								
Loxodonta Africana	African Savannah Elephant	V; SPG	√	V; Protected from hunting	√		V	C2
Bats								
Eidolon helvum	African Straw-coloured Fruit Bat	Secure; Migrant	√		√		NT	
Epomophorus angolensis	Angolan Epauletted Fruit Bat	Per	√		√	NT*	NT	
Epomophorus crypturus	Peter's Epauletted Fruit Bat	-			√			
Epomophorus wahlbergi	Wahlberg's Epauletted Fruit Bat	-			√			
Epomops dobsonii	Dobson's Epauletted Fruit Bat	Not Listed	√		√			
Lissonycteris angolensis	Angolan Soft-furred Fruit Bat	-			√			
Micropteropus pusillus	Peter's Lesser Epauletted Fruit Bat	-			√			
Rousettus aegyptiacus	Egyptian Rousette	Not Listed	√		√			
Cloeotis percivali	Percival's Short-eared Trident Bat	-			√	V*		
Hipposideros caffer	Sundevall's Roundleaf Bat	Secure	√		√	DD		
Hipposideros gigas	Giant Leaf-nosed Bat	Not Listed	√		√	DD*		
Hipposideros ruber	Noack's Leaf-nosed Bat	-			√			
Hipposideros vittatus	Striped Leaf-nosed Bat	Not Listed	√		√		NT	
Rhinolophus blasii	Blasius's Horseshoe Bat	-			√			
Rhinolophus clivosus	Geoffroy's Horseshoe Bat	-			√			
Rhinolophus darling	Darling's Horseshoe Bat	Secure	√		√	NT		
Rhinolophus denti	Dent's Horseshoe Bat	Secure	√		√	NT; DD*		
Rhinolophus fumigates	Rüppell's Horseshoe Bat	Secure	√		√	NT		
Rhinolophus hildebrandtii	Hildebrandt's Horseshoe Bat	Not Listed	√		√			

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International Status		
						SARDB	IUCN	CITES
Rhinolophus landeri	Landers Horseshoe Bat	-			√			
Rhinolophus simulator	Bushveld Horseshoe Bat	-			√			
Rhinolophus swinnyi	Swinny's Horseshoe Bat	Not Listed	√		√	NT*		
Taphozous mauritianus	Mauritian Tomb Bat	Secure	√		√			
Nycteris macrotis	Large-eared Slit-faced Bat	-			√			
Nycteris thebaica	Egyptian Slit-faced Bat	Secure	√		√			
Chaerephon ansorgei	Ansorge's Free-tailed Bat	Not Listed	√		√			
Chaerephon chapini	Pale Free-tailed Bat	Not Listed	√		√			
Chaerephon nigeriae	Nigerian Free-tailed Bat	Secure	√		√			
Chaerephon pumilus	Little Free-tailed Bat	-			√			
Mops midas	Midas Free-tailed Bat	Secure	√		√			
Tadarida aegyptiaca	Egyptian Free-tailed Bat	Secure	√		√			
Miniopterus natalensis	Natal Long-fingered Bat	Secure	√		√	NT; NT*		
Cistugo seabrai	Namibian Wing-gland Bat	End; R	√			V		
Eptesicus hottentotus	Long-tailed Serotine Bat	Secure	√		√			
Glauconycteris variegata	Variegated Butterfly Bat	Secure	√		√	NT		
Pipistrellus (Hypsugo) anchietae	Anchieta's Pipistrelle	Not Listed	√		√			
Kerivoula argentata	Damara Woolly Bat	-			√			
Kerivoula lanosa	Lesser Woolly Bat	-			√			
Laephotis botswanae	Botswana Long-eared Bat	Secure	√		√	V		
MiMEillus thomasi	Thomas's Flat-headed Bat	Not Listed	√		√			
Neoromicia capensis	Cape Serotine Bat	Secure	√		√			
Neoromicia nana	Banana Bat	Secure	√		√			
Neoromicia zuluensis	Zulu Serotine Bat	Secure	√		√			
Nycticeinops schlieffeni	Schlieffen's Twilight Bat	Secure	√		√			
Pipistrellus hesperidus	Dusky Pipistrelle	-			√			
Pipistrellus rueppellii	Rűppell's Pipistrelle	I-kn; Per	√		√			
Pipistrellus rusticus	Rusty Pipistrelle	Secure	√		√	NT		
Scotophilus dinganii	Yellow-bellied House Bat	Secure	√		√			
Scotophilus leucogaster	White-bellied House Bat	Not Listed	√		√			
Hares and Rabbits								
Lepus capensis	Cape Hare	Secure	√		√			
Lepus saxatilis	Scrub Hare	Secure	√		√			
Pronolagus randensis	Jameson's Red Rock Rabbit	Secure	√		√			
Rodents								
Porcupine								
Hystrix africaeaustralis	Cape Porcupine	Secure	√		√			

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International Status		
						SARDB	IUCN	CITES
Canerats								
Thryonomys swinderianus	Greater Canerat	-			√			
Rats and Mice								
Petromys typicus	Dassie Rat	End; Secure	√		√	NT		
Pedetes capensis	Springhare	Secure	√		√			
Xerus princeps	Damara Ground Squirrel	End	√		√	NT		
Funisciurus congicus	Striped Tree Squirrel	Secure	√		√			
Graphiurus (rupicola) platyops	Western Rock Dormouse	End; Secure	√		√	DD		
Graphiurus murinus	Woodland Dormouse	Secure	√		√			
Lemniscomys rosalia	Single-striped Grass Mouse	Secure	√		√	DD		
Rhabdomys pumilio	Four-striped Grass Mouse	Secure	√		√			
Mus indutus	Desert Pygmy Mouse	Secure	√		√			
Mastomys natalensis	Natal Multimammate Mouse	Secure	√		√			
Mastomys coucha	Southern Multimammate Mouse	Secure	√		√			
Thallomys paedulcus	Acacia Rat	Secure	√		√			
Thallomys nigricauda	Black-tailed Tree Rat	Secure	√		√			
Aethomys chrysophilus	Red Veld Rat	Secure	√		√			
Micaelamys namaquensis	Namaqua Rock Mouse	Secure	√		√			
Desmodillus auricularis	Cape Short-tailed Gerbil	Secure	√		√			
Gerbillurus paeba infernus	Hairy-footed Gerbil	End; I-kn	√		√			
Tatera leucogaster	Bushveld Gerbil	Secure	√		√	DD		
Cricetomys gambianus	Gambian Giant Rat	-			√			
Malacothrix typical	Gerbil Mouse	Secure	√		√			
Dendromus melanotis	Grey Climbing Mouse	Per	√					
Steatomys pratensis	Fat Mouse	Secure	√		√			
Steatomys parvus	Tiny Fat Mouse	Per	√		√			
Petromyscus collinus	Pygmy Rock Mouse	End; Secure	√		√			
Petromyscus shortridgei	Shortridge's Rock Mouse	Secure	√		√			
Mus musculus	House Mouse	Invasive alien	√					
Primates								
Otolemur crassicaudatus	Greater Galago	-			√			
Galago moholi	South African Galago	V; PG	√		√			C2
Papio ursinus	Chacma Baboon	Secure; Prob A	√	VExt	√			C2
Cercopihecus pygerythrus	Vervet Monkey	Secure	√		√			C2
Hedgehog								
Atelerix frontalis angolae	Southern African Hedgehog	I-kn; R; PG	√		√	R; NT		
Manidae								

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International Status		
						SARDB	IUCN	CITES
Smutsia (Manis) temminckii	Ground Pangolin	V; Per; PG	√	V	√	V	V	C2
Carnivores								
Proteles cristatus	Aardwolf	I-kn; V?; Per	√	VExt	√			
Parahaena (Hyaena) brunnea	Brown Hyena	I-kn; V?; Per	√	Ext	√	NT	NT	
Crocuta crocuta	Spotted Hyena	Secure?; Per	√	VExt	√	NT		
Acinonyx jubatus	Cheetah	V; PG	√	VExt		V	V	C1
Panthera leo	Lion	Ind; Per; PG	√	VExt	√	V	V	C2
Panthera pardus	Leopard	Secure?; Per; PG	√	V	√		V	C1
Caracal caracal	Caracal	Secure; Prob A	√	V	√			C2
Felis silvestris	African Wild Cat	V	√	V	√			C2
Leptailurus serval	Serval	-		V	√			
Civettictis civetta	African Civet	-		V	√			
Genetta genetta	Small Spotted Genet	Secure	√		√			
Suricata suricatta marjoriae	Suricate	End; Secure	√	VExt				
Paracynictis selousi	Selous' Mongoose	-			√			
Cynictis penicillata	Yellow Mongoose	Secure	√					
Herpestes ichneumon	Large Grey Mongoose	-			√			
Galerella sanguine	Slender Mongoose	Secure	√		√			
Galerella nigrata	Kaokoland Slender Mongoose	End; Secure	√		√			
Atilax paludinosus	Marsh Mongoose	Ind	√		√			
Mungos mungo	Banded Mongoose	Secure	√		√			
Helogale parvula	Dwarf Mongoose	Secure	√		√			
Otocyon megalotis	Bat-eared Fox	V?; Per	√	V	√			
Vulpes chama	Cape Fox	V?	√	VExt	√			
Canis adustus	Side-striped Jackal	-		V	√			
Canis mesomelas	Black-backed Jackal	Secure; Prob A	√	V	√			
Aonyx capensis	African Clawless Otter	-			√		NT	
Hydrictis (Lutra) maculicollis	Spotted-necked Otter	E?; Ind; Per; PG	√	V	√	NT	NT	C2
Mellivora capensis	Honey Badger/Ratel	Secure; PG	√	V	√	NT		
Ictonyx striatus	Striped Polecat	Secure	√		√			
Zebra								
Equus burchellii or Equus quagga	Plains Zebra	Secure; Per; SPG	√?	V	√?			
Equus zebra hartmannae	Hartmann's Mountain Zebra	End; Secure; SPG	√?	VExt	√?	E	V	C2
Suidae								
Phacochoerus africanus	Common Warthog	Secure; Hunt	√		√			
Hippo								
Hippopotamus amphibious	Hippopotamus	E; Per; SPG	√		√		V	C2

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International Status		
						SARDB	IUCN	CITES
Antelopes								
Giraffa camelopardalis	Giraffe	V; Per; SPG	√	VExt; Protected from hunting			V	
Tragelaphus strepsiceros	Greater Kudu	Secure; Hunt	√		√?			
Oryx gazelle	Gemsbok	Secure; Hunt	√		√?			
Sylvicapra grimmia	Common Duiker	Secure	√	VExt	√			
Antidorcas marsupialis	Springbok	Secure; Hunt	√		√			
Madoqua damarensis	Damara Dik-dik	I-kn; PG	√		√			
Raphicerus campestris	Steenbok	Secure; PG	√		√			
Aepyceros melampus petersi	Black-faced Impala	End; Ind; V; Per; SPG	√		√?		V	
Oreotragus oreotragus	Klipspringer	Secure; SPG	√		√			

Namibian conservation and legal status according to the Namibian Conservation Ordinance No 4. of 1975 (Griffin 2003)
End = Endemic; R? = Rare (expected); E = Endangered; V = Vulnerable; I-kn = Insufficiently Known; Ind = Indeterminate; Hunt = Huntable Game; Prob A = Problem Animal; Per = Peripheral; SPG = Specially Protected Game; PG = Protected Game
IUCN (2019) – International Union for the Conservation of Nature and Natural Resources [All species not listed by the IUCN (2019) have not yet been assessed for the IUCN Red List]. V = Vulnerable; NT = Near Threatened; LC = Least Concern
SARDB (2004) – South African Red Data Book. V = Vulnerable; NT = Near Threatened; DD = Data Deficient
CITES – Convention on International Trade in Endangered Species of Wild Fauna and Flora. C1 and 2 = CITES Appendix 1 and 2 species.
* = Monadjem et al. (2010)
Angolan legislation: Ext = Extinct; VExt = Verge of Extinction; V = Vulnerable (Ministério do Ambiente 2018)
Protected from hunting (Angola) = It is illegal to hunt 28 mammal species in Angola (e.g. e.g. giant sable, elephant, giraffe, rhino) (de Queiroz et al. 2008).
Source for literature review: Anon (2019), Beja et al. (2019), De Graaff (1981), de Queiroz et al. (2008), Estes (1995), Frost (2014), Griffin (1998c), Griffin and Coetzee (2005), IUCN (2019), Joubert and Mostert (1975), Monadjem et al. (2010), Rodrigues et al. (2014), Skinner and Smithers (1990), Skinner and Chimimba (2005), Stander and Hansson (2003) and Taylor (2000)

Table E.7: Bird diversity known and/or expected to occur in the general area – i.e. between the Lubango Substation and the Cunene River areas (southwest Angola and northwest Namibia).

This table excludes marine birds (e.g. gulls and terns, etc.) and species breeding extralimital (e.g. stints, sandpipers, etc.) and rather focuses on birds that are breeding residents or can be found in the area during any time of the year. This would imply that many more birds (e.g. Palaearctic migrants and/or vagrants) could occur in the area depending on environmental conditions.

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International status	
						Southern Africa	IUCN (2019)
Struthio camelus	Common Ostrich		√	V	√		
Scleroptila levailantoides	Orange River Francolin		√		√	N-End	
Pternistis hartlaubi	Hartlaub's Spurfowl	End	√	Sp	√	N-End	
Francolinus adspersus	Red-billed Spurfowl		√		√	N-End	
Pternistis afer	Red-necked Spurfowl		√		√		
Pternistis swainsonii	Swainson's Spurfowl		√		√		
Numida meleagris	HelMEed Guineafowl		√		√		
Alopochen aegyptiaca	Egyptian Goose		√		√		
Plectropterus gambensis	Spur-winged Goose		√		√		
Sarkidiornis melanotos	Comb Duck		√		√		
Anas erythrorhyncha	Red-billed Teal		√		√		
Indicator indicator	Greater Honeyguide		√		√		
Campethera abingoni	Golden-tailed Woodpecker		√		√		
Dendropicos fuscescens	Cardinal Woodpecker		√		√		
Thrioias namaquus	Bearded Woodpecker		√		√		
Lybius leucomelas	Acacia Pied Barbet		√		√	N-End	
Tockus monteiri	Monteiro's Hornbill	End	√	V	√		
Tockus damarensis	Damara Hornbill	End	√	V	√	N-End	
Tockus flavirostris	Southern Yellow-billed Hornbill		√		√	N-End	
Tockus bradfieldi	Bradfield's Hornbill		√		√	N-End	
Tockus nasutus	African Grey Hornbill		√		√		
Bucorvus leadbeateri	Southern Ground-Hornbill	E	√		√		V
Upupa africana	African Hoopoe		√		√		
Phoeniculus purpureus	Green Wood-Hoopoe		√		√		
Phoeniculus damarensis	Violet Wood-Hoopoe	E; N-End	√	Sp	√		

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International status	
						Southern Africa	IUCN (2019)
Phoeniculus cyanomelas	Common Scimitarbill		√		√		
Coracias caudate	Lilac-breasted Roller		√		√		
Coracias naevia	Purple Roller		√		√		
Coracias garrulus	European Roller	NT	√		√		
Alcedo cristata	Malachite Kingfisher		√		√		
Ispidina picta	African-Pygmy-Kingfisher		√		√		
Halcyon leucocephela	Grey-headed Kingfisher		√		√		
Halcyon senegalensis	Woodland Kingfisher		√		√		
Megaceryle maxima	Giant Kingfisher		√		√		
Ceryle rudis	Pied Kingfisher		√		√		
Merops pusillus	Little Bee-eater		√		√		
Merops hirundineus	Swallow-tailed Bee-eater		√		√		
Merops persicus	Blue-cheeked Bee-eater		√		√		
Merops superciliosus	Madagascar Bee-eater		√		√		
Colius colius	White-backed Mousebird		√		?		
Colius indicus	Red-faced Mousebird		√		√		
Poicephalus rueppellii	Rüppell's Parrot	NT; N-End	√	Sp	√	N-End	
Agapornis roseicollis	Rosy-faced Lovebird	End	√		√	N-End	
Cypsiurus parvus	African Palm-Swift		√		√		
Tachymarptis melba	Alpine Swift		√		√		
Apus bradfieldi	Bradfield's Swift		√		√	N-End	
Apus affinis	Little Swift		√		√		
Apus horus	Horus Swift		√		√		
Apus caffer	White-rumped Swift		√		√		
Corythaixoides concolor	Grey Go-away-bird		√		√		
Tyto alba	Barn Owl		√		√		
Otus senegalensis	African Scops-Owl		√		√		
Otus leucotis	Southern White-faced Scops-Owl		√		√		
Bubo africanus	Spotted Eagle-Owl		√		√		
Bubo lacteus	Verreaux's Eagle-Owl		√		√		
Glaucidium perlatum	Pearl-spotted Owlet		√		√		
Caprimulgus pectoralis	Fiery-necked Nightjar		√		√		

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International status	
						Southern Africa	IUCN (2019)
Caprimulgus tristigma	Freckled Nightjar		√		√		
Caprimulgus fossii	Square-tailed Nightjar		√		√		
Caprimulgus rufigenta	Rufous-cheeked Nightjar		√		√		
Columba guinea	Speckled Pigeon		√		√		
Streptopelia senegalensis	Laughing Dove		√		√		
Streptopelia decipiens	African Mourning Dove		√		√		
Streptopelia capicola	Cape Turtle Dove		√		√		
Streptopelia semitorquata	Red-eyed Dove		√		√		
Turtur chalcospilos	Emerald-spotted Wood Dove		√		√		
Oena capensis	Namaqua Dove		√		√		
Treron calvus	African Green-Pigeon		√		√		
Ardeotis kori	Kori Bustard	NT	√		√		NT
Eupodotis rufisrista	Red-crested Korhaan		√		√	N-End	
Amourornis flavirostris	Black Crake		√		√		
Porphyrio madagascariensis	African Purple Swamphen		√		√		
Gallinula chloropus	Common Moorhen		√		√		
Pterocles namaqua	Namaqua Sandgrouse		√		√	N-End	
Pterocles bicinctus	Double-banded Sandgrouse		√		√	N-End	
Pterocles bicinctus	Burchell's Sandgrouse		√		√	N-End	
Rostratula benghalensis	Greater Painted-snipe		√		√		
Actophilornis africanus	African Jacana		√		√		
Burhinus vermiculatus	Water Thick-knee		√		√		
Burhinus capensis	Spotted Thick-knee		√		√		
Charadrius tricollaris	Three-banded Plover		√		√		
Vanellus armatus	Blacksmith Lapwing		√		√		
Vanellus coronatus	Crowned Lapwing		√		√		
Cursorius temminckii	Temminck's Courser		√		√		
Pandion haliaetus	Osprey		√		√		
Milvus migrans	Black Kite		√		√		
Haliaeetus vocifer	African Fish Eagle	V	√		√		
Gyps africanus	White-backed Vulture	E	√		√		CR
Trigonoceps occipitalis	White-headed Vulture	V	√		√		CR

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International status	
						Southern Africa	IUCN (2019)
Circaetus gallicus	Black-chested Snake Eagle		√		√		
Circaetus cinereus	Brown Snake Eagle		√		√		
Terathopius ecaudatus	Bateleur	E	√		√		NT
Polyboroides typus	African Harrier-Hawk		√		√		
Circus ranivorus	African Marsh-Harrier	E	√		√		
Melierax canorus	Southern Pale Chanting Goshawk		√		√	N-End	
Micronisus gabar	Gabar Goshawk		√		√		
Accipter badius	Shikra		√		√		
Accipiter ovampensis	Ovambo Sparrowhawk		√		√		
Buteo vulpinus	Steppe Buzzard		√		√		
Buteo augur	Augur Buzzard		√		√		
Aquila rapax	Tawny Eagle	E	√		√		V
Aquila verreauxii	Verreaux's Eagle	NT	√		√		
Hieraaetus fasciatus	African Hawk-Eagle		√		√		
Aquila pennatus	Booted Eagle	E	√		√		
Aquila wahlbergi	Wahlberg's Eagle		√		√		
Polemaetus bellicosus	Martial Eagle	E	√		√		V
Sagittarius serpentarius	Secretarybird	V			√		V
Falco rupicolus	Rock Kestrel		√		√		
Falco ardosiaceus	Grey Kestrel		√		√		
Falco biarmicus	Lanner Falcon		√		√		
Falco peregrinus	Peregrine Falcon	NT	√		√		
Egretta ardesiaca	Black Heron		√		√		
Egretta garzetta	Little Egret		√		√		
Egretta intermedia	Yellow-billed Egret		√		√		
Egretta alba	Great Egret		√		√		
Ardea cirerea	Grey Heron		√		√		
Ardea melanocephela	Black-headed Heron		√		√		
Ardea goliath	Goliath Heron		√		√		
Ardea purpurea	Purple Heron		√		√		
Ardeola ralloides	Squacco Heron		√		√		
Ardeola rufiventris	Rufous-bellied Heron	E	√		√		

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International status	
						Southern Africa	IUCN (2019)
Butorides striata	Green-backed Heron		√		√		
Nycticorax nycticorax	Black-crowned Night-Heron		√		√		
Ixobrychus sturmii	Dwarf Bittern		√		√		
Scopus umbretta	Hamerkop		√		√		
Mycteria ibis	Yellow-billed Stork		√		√		
Anastomus lamelligerus	African Openbill		√		√		
Ciconia nigra	Black Stork	E	√		√		
Cicornia abdimii	Abdim's Stork		√		√		
Circonia episcopus	Wooly-necked Stork				√		
Leptoptilos crumenifer	Marabou Stork	NT	√		√		
Oriolus auratus	African Golden Oriole		√		√		
Dicrurus adsimilis	Fork-tailed Drongo		√		√		
Terpsiphone viridis	African Paradise-Flycatcher		√		√		
Nilaus afer	Brubru		√		√		
Dryoscopus cubla	Black-backed Puffback		√		√		
Tchagra australis	Brown-crowned Tchagra		√		√		
Laniarius bicolor	Swamp Boubou		√		√		
Laniarius atrococcineus	Crimson-breasted Shrike		√		√	N-End	
Telophorus zeylonus	Bokmakierie		√		√	N-End	
Malaconotus blanchoti	Grey-headed Bush-Shrike		√		√		
Prionops plumatus	White-crested HelME-Shrike		√		√		
Prionops retzii	Retz's HelME-Shrike		√		√		
Lanioturdus torquatus	White-tailed Shrike	End	√	V; Sp	√	N-End	
Batis pririt	Pririt Batis		√		√	N-End	
Corvus albus	Pied Crow		√		√		
Lanius collaris	Common Fiscal		√		√		
Eurocephalus anguitimens	Southern White-crowned Shrike		√		√	N-End	
Campephaga flava	Black Cuckooshrike		√		√		
Anthoscopus minutes	Cape Penduline-Tit		√			N-End	
Parus niger	Southern Black Tit		√		√		
Parus carpi	Carp's Tit	End	√	V; Sp	√		
Parus cinerascens	Ashy Tit		√			N-End	

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International status	
						Southern Africa	IUCN (2019)
Achaetops pycnopygius	Rockrunner	End	√	Sp			
Riparia paludicola	Brown-throated Martin		√		√		
Riparia cincta	Banded Martin		√		√		
Pseudhirundo griseopyga	Grey-rumped Swallow		√		√		
Hirundo angolensis	Angola Swallow		√		√		
Hirundo albigularis	White-throated Swallow		√		√		
Hirundo smithii	Wire-tailed Swallow		√		√		
Hirundo dimidiata	Pearl-breasted Swallow		√		√		
Hirundo cucullata	Greater Stripped Swallow		√		√		
Hirundo abyssinica	Lesser Stripped Swallow		√		√		
Hirundo semirufa	Red-breasted Swallow		√		√		
Hirundo senegalensis	Mosque Swallow		√		√		
Hirundo fuligula	Rock Martin		√		√		
Pycnonotus nigricans	African Red-eyed Bulbul		√		√	N-End	
Chlorocichla flaviventris	Yellow-bellied Greenbul		√		√		
Sylvietta rufescens	Long-billed Crombec		√		√		
Eremomela icteropygialis	Yellow-bellied Eremomela		√		√		
Acrocephalus baeticatus	African Reed-Warbler		√		√		
Acrocephalus gracilirostris	Lesser Swamp-Warbler		√		√		
Turdoides melanops	Black-faced Babbler		√			N-End	
Turdoides hartlaubii	Hartlaub's Babbler		√		√		
Turdoides bicolor	Southern Pied Babbler		√		√		
Turdoides gymnogenys	Bare-cheeked Babbler	End	√	Sp			
Parisoma subcaeruleum	Chestnut-vented Tit-Babbler		√		√	N-End	
Cisticola chiniana	Rattling Cisticola		√		√		
Cisticola laupula	Laupula Cisticola		√	V	√		
Cisticola juncidis	Zitting Cisticola		√		√		
Prinia subflava	Tawny-flanked Prinia		√		√		
Prinia flavicans	Black-chested Prinia		√		√		
Apalis flavida	Yellow-breasted Apalis		√		√		
Camaroptera brevicaudata	Grey-backed Camaroptera		√		√		
Calamonastes fasciolatus	Barred Wren-warbler		√		√	N-End	

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International status	
						Southern Africa	IUCN (2019)
Mirafra passerine	Monotonous Lark		√		√	N-End	
Mirafra africana	Rufous-naped Lark		√		√		
Mirafra sabota	Sabota Lark		√		√		
Mirafra africanoides	Fawn-coloured Lark		√		√	N-End	
Pinarocorys nigricans	Dusky Lark		√		√		
Chersomanes albofasciata	Spike-heeled Lark		√		√	N-End	
Certhilauda benguelensis	Benguela Long-billed Lark	End	√	Sp	√	N-End	
Eremopterix leucotis	Chestnut-backed Sparrowlark		√		√		
Eremopterix verticalis	Grey-backed Sparrowlark		√		√	N-End	
Calandrella cinerea	Red-capped Lark		√		√		
Monticola brevipes	Short-toed Rock-thrush		√		√	N-End	
Turdus litsitsirupa	Groundscraper Thrush		√		√		
Melaenornis infuscatus	Chat Flycatcher		√		√	N-End	
Melaenornis mariquensis	Marico Flycatcher		√		√	N-End	
Cichladusa ruficauda	Rufous-tailed Palm Thrush		√	Sp	√		
Cercotrichas leucophrys	White-browed Scrub- Robin		√		√		
Erythropygia paena	Kalahari Scrub-Robin		√		√		
Namibornis herero	Herero Chat	End	√	V; Sp		N-End	
Oenanthe monticpla	Mountain Wheatear		√		√	N-End	
Oenanthe pileata	Capped Wheatear		√		√		
Cercomela schlegelii	Karoo Chat		√		√	N-End	
Cercomela familiaris	Familiar Chat		√		√		
Cercomela tractrac	Tractrac Chat		√		√	N-End	
Myrmecocichla formicivora	Ant-eating Chat		√			End	
Myrmecocichla arnoti	Arnot's Chat		√		√		
Xenocopsychus ansorgei	Angola cave chat			VExt; V; End; Sp	√		
Onychognathus nabouroup	Pale-winged Starling		√		√	N-End	
Lamprotornis nitens	Cape Glossy Starling		√		√		
Lamprotornis chalybaeus	Greater Blue-eared Starling		√		√		
Lamprotornis australis	Burchell's Starling		√		√	N-End	
Lamprotornis mevesii	Meves's Starling		√		√		
Cinnyricinclus leucogaster	Violet-backed Starling		√		√		

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International status	
						Southern Africa	IUCN (2019)
Creatophora cinerea	Wattled Starling		√		√		
Buphagus africanus	Yellow-billed Oxpecker	E	√		√		
Chalcomitra aMEhystina	AMEhyst Sunbird		√		√		
Nectarinia senegalensis	Scarlet-chested Sunbird		√		√		
Cinnyris talatala	White-bellied Sunbird		√		√		
Cinnyris fuscus	Dusky Sunbird		√		√	N-End	
Nectarinia mariquensis	Marico Sunbird		√		√		
Bubalornis niger	Red-billed Buffalo- Weaver		√		√		
Sporopipes squamifrons	Scaly-feathered Finch		√		√	N-End	
Plocepasser mahali	White-browed Sparrow-weaver		√		√		
Ploceus intermedius	Lesser Masked Weaver		√		√		
Ploceus ocularis	Spectacled Weaver		√		√		
Ploceus xanthops	Golden Weaver		√		√		
Ploceus velatus	Southern Masked Weaver		√		√		
Ploceus cucullatus	Village Weaver				√		
Ploceus rubiginosus	Chestnut Weaver		√		√		
Anaplectes melanotis	Red-headed Weaver		√		√		
Quelea quelea	Red-billed Quelea		√		√		
Euplectes afer	Yellow-crowned Bishop		√		√		
Euplectes orix	Southern Red Bishop		√		√		
Amadina erythrocephala	Red-headed Finch		√		√	N-End	
Estrilda thomensis	Cinderella Waxbill	E; End	√	VExt; End; Sp	√		
Estrilda astrild	Common Waxbill		√		√		
Uraeginthus granatinus	Violet-eared Waxbill		√		√		
Uraeginthus angolensis	Blue Waxbill		√		√		
Pytilia melba	Green-winged Pytilia		√		√		
Lagonosticta senegala	Red-billed Firefinch		√		√		
Lagonosticta rhodopareia	Jameson's Firefinch		√		√		
Vidua paradisaea	Long-tailed Paradise Whydah		√		√		
Vidua regia	Shaft-tailed Whydah		√		√	N-End	
Vidua purpurrascens	Purple Indigobird				√		
Passer domesticus	House Sparrow		√		√		

Species: Scientific name	Species: Common name	Namibian conservation and legal status	Expected	Angolan conservation and legal status	Expected	International status	
						Southern Africa	IUCN (2019)
Passer montitesis	Great Sparrow		√		√	N-End	
Passer melanurus	Cape Sparrow		√		√	N-End	
Passer diffusus	Southern Grey-headed Sparrow		√		√		
Passer griseus	Northern Grey-headed Sparrow		√		√		
Serinus atrogularis	Black-throated Canary		√				
Serinus flaviventris	Yellow Canary		√		√	N-End	
Crithagra albogularis	White-throated Canary		√		√	N-End	
Emberiza impetuani	Lark-like Bunting		√		√	N-End	
Emberiza tahapisi	Cinnamon-breasted Bunting		√		√		
Emberiza capensis	Cape Bunting		√		√	N-End	
Emberiza flaviventris	Golden-breasted Bunting		√		√		

Namibia: End – Endemic; N-End – Near Endemic (Simmons et al. 2015)
Southern Africa: E – Endemic; NE – Near Endemic (Hockey et al. 2006)
IUCN (2019): CR = Critically Endangered; E – Endangered; V – Vulnerable; NT – Near Threatened
Angola: Sp = Special Birds. Special birds are defined as species that are near-endemic – occur in only one other country or that have more than half their range/population in Angola – or are difficult to see outside of Angola (Mills and Melo 2013).
Angola: End = Endemic (Dean et al. 2019)
Angolan legislation: VExt = Verge of Extinction; V = Vulnerable (Ministério do Ambiente 2018)
Protected from hunting (Angola) = It is illegal to hunt 19 bird species in Angola (e.g. penguins) (de Queiroz et al. 2008).
Source for literature review: Brown et al. (1998), Dean et al. (2019), de Queiroz et al. (2008), Hockey et al. (2006), IUCN (2019), Komen (n.d.), Little and Crowe (2011), Maclean (1985), Mills and Melo (2013), Simmons et al. (2015) and Tarboton (2001)

Annexure F: Heritage photographic register

Figure 1. Proposed location of the Lubango Substation

Figure 2. Landscape from the proposed Lubango Substation looking towards Lubango

Figure 3. Modern pastoralism

Figure 4. Community graveyard (east of Lubango at the northern end of the corridor)

Figure 5. Community graveyard (east of Lubango at the northern end of the corridor)

Figure 6. Grave within graveyard

Figure 7. Potsherds commonly found close to villages (non-diagnostic)

Figure 8. Non-diagnostic potsherds

Figure 9. Village close to Lubango

Figure 10. Traditional brick ovens outside Lubango

Figure 11. Late Stone Age core (isolated find)

Figure 12. Portuguese architecture in Chibemba

Figure 13. Modern farming close to Cahama

Figure 14. Waterways close to Capunda Cavilango (investigative access not granted)

Figure 15. Military demining escort

Figure 16. Livestock types

Figure 17. Decorated potsherds pocated on road (out of context and non-diagnostic)

Figure 18. A rocky ridge close to Lufinda (investigative access not granted)

Figure 19. A granite mine close to Lufinda

Figure 20. A view of the proposed route following the foothills close to Quihita (access not possible)

Figure 21. Signs of granite mining

Figure 22. Signs of granite mining

Figure 23. Brush and branch enclosures

Figure 24. The landscape around Carmira, north of Cahama (note alluvial sediment)

Figure 25. Fallen heroes monument in Cahama (turn-off to Otchinjau)

Figure 26. Cahama (main street)

Figure 27. Drone flight explained to military personnel

Figure 28. Recording drone data

Figure 29. Water point and stone cistern (Calovango)

Figure 30. Stone cistern at Calovango

Figure 31. Riverbed outside of Cahama

Figure 32. River at Cahama

Figure 33. Interviews at Calovango

Figure 34. Middle- to Late Stone Age cores at Calovango

Figure 35. Middle- to Late Stone Age cores and scraper

Figure 36. Stone tools in situ

Figure 37. Mopane branch enclosures

Figure 38. Drone operation shown to local inhabitants

Figure 39. Unnamed village south of Calovango

Figure 40. Traditional mortar

Figure 41. Interviews with villagers

Figure 42. Interviews with a village elder

Figure 43. Grinding stones still in ise in a village

Figure 44. Children in traditional (and modern) garb

Figure 45. Village woman in traditional clothing

Figure 46. Escort during field investigation

Figure 47. War damage to buildings outside Xangongo

Figure 48. Overgrazing along the Kunene River

ANNA

TRANSMISSION PROJECT

ANNA TRANSACTION ADVISORY SERVICES

Environmental and Social Impact Assessment

Angola

Volume III - Environmental and Social Management Plan (ESMP)

March 2020

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CONTACT DETAILS

The contact details for the responsible parties associated with the execution of this ESMP are as follows:

Table 1.1: Details of the Implementing Agent – Project Director/Engineer

Company	Rede Nacional de Transporte de Electricidade (RNT)
Contact Person	Tárcio Cardoso
Physical Address	RNT Luanda - Gaveto entre a Estrada da Camama e a Via Expressa
Telephone Number	+244 923 927 355
Email Address	tcardoso@rnt.co.ao

Table 1.2: Details of the Implementing Agent - Grievances

Company	Rede Nacional de Transporte de Electricidade (RNT)
Contact Person	Tárcio Cardoso
Physical Address	RNT Luanda - Gaveto entre a Estrada da Camama e a Via Expressa
Telephone Number	+244 923 927 355
Email Address	tcardoso@rnt.co.ao

Table 1.3: Details of the Funding Agent

Company	DBSA
Contact Person	Libby Dreyer
Postal Address	P O Box 1234 Halfway House 1685 South Africa
Physical Address	Development Bank of Southern Africa Headway Hill 1258 Lever Road Midrand South Africa
Telephone Number	+27 11 313 3507
Email Address	libbyd@dbsa.org

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VOLUME III – ESMP: TABLE OF CONTENTS

Annexures

List of Figures

List of Tables

ABBREVIATIONS

Abbreviation	Definition
AAAC	All-Aluminium Alloy Conductor
AC	Alternating Current
ACSR	Aluminium Conductor Steel Reinforced
AIDS	Acquired Immune Deficiency Syndrome
AML	Lubango Municipal Administration (Administração Municipal do Lubango)
ANNA	Angola-Namibia Interconnector Project
ANR	National Waste Agency - Agência Nacional de Resíduos
BAU	Business as Usual
BCE	Before the Common Era
BESS	Battery Energy Storage System
°C	Celsius
CBD	Convention on Biological Diversity
CCS	Carbon Capture and Storage
CE	Common Era
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COP	Conferences of the Parties
DAI	Direct Area of Influence
DBSA	Development Bank of Southern Africa
DoD	Depth of Discharge
DNPAIA	Direcção Nacional de Prevenção e Avaliação de Impactes Ambientais - National Direction for Prevention and Assessment of Environmental Impacts
DRC	Democratic Republic of Congo
EBRD	European Bank for Reconstruction and Development
ECB	Electricity Control Board
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
EL	Environmental Licence
EMF	Electromagnetic Field
ENDE	National Electricity Distribution Company
ENSO	El Niño–Southern Oscillation
EO	Environmental Officer
EPC	Engineering, Procurement, Construction
EPFI	Equator Principles Financial Institution
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESSS	Environmental and Social Safeguard Standard
EU	European Union
Ex	Extinct Species
FACTS	Flexible AC transmission systems
FI	Financial Intermediary
FNLA	National Front for the Liberation of Angola
FPIC	Free, Prior and Informed Consultation
GCM	Global Climate Models
GEF	Global Environment Fund
GHG	Greenhouse Gas
GIS	Geographic Information System
GM	Grievance Mechanism

Abbreviation	Definition
GRAE	Angola's Revolutionary Government in Exile
GWP	Global Warming Potential
ha	Hectare
HDPE	High-density polyethylene
HIV	Human Immunodeficiency Virus
HVAC	Heating, Ventilation and Air Conditioning
HVDC	High Voltage Direct Current
IAI	Indirect Area of Influence
I&AP	Interested and Affected Party
IBA	Important Bird Area
ICP	Informed Consultation and Participation
IFC	International Finance Corporation
INDC	Intended Nationally Determined Contribution
INRH	National Institute of Water Resources of Angola
IP	Indigenous People
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IRP	Integrated Resource Plan
ISO	International Standards Organization
IUCN	International Union for Conservation of Nature
km	Kilometre
kT	Kilo Tonnes
kV	Kilovolt
LIDAR	Light Detection and Ranging
LLSU	Large Livestock Stock Units
L&FS	Life and Fire Safety
LSA	Later Stone Age
LVIA	Landscape and Visual Assessment
masl	Metres above sea level
MANco	Management Committee
MAV	Maximum Allowed Values
m	Metre
m^2	Square Metre
MCDM	Multi-Criteria Decision Making
MFA	Armed Forces Movement
MINAMB	Angolan Ministry of Environment
MPI	Multidimensional Poverty Index
MPLA	People's Movement for the Liberation of Angola
MSA	Middle Stone Age
MVA	Mega Volt Amp
MW	Megawatt
MWh	Megawatt Hour
MWp	Megawatt Peak
NamPower	Namibia Power Corporation (Proprietary) Limited
MRV	Maximum Recommended Values
NAPA	National Adaptation Programme of Action
NOx	Nitrous Oxide
NTS	Non-Technical Summary
OCGTs	Open Cycle Gas Turbines
OECD	Organisation for Economic Co-operation and Development
OHS	Operational Health and Safety
OPEC	Organization of the Petroleum Exporting Countries
OPGW	Optical Ground Wire
OPHI	Oxford Poverty and Human Development Initiative
PAC	Project Affected Community
PAP	Project Affected Person

Abbreviation	Definition
PM	Particulate Matter
PNAAC	National Climate Change Adaptation Plan
PNE	National Emissions Plan
PPE	Personal Protective Equipment
PRODEL	“Empresa Pública de Produção de Electricidade”
PS	Performance Standard
PV	Photovoltaic
RAI	Regional Area of Influence
RAP	Resettlement Action Plan
RCP	Representative Concentration Pathways
REPTUR	General Regulation on the Territorial, Urbanistic and Rural Plans
RNT	Rede Nacional de Transporte de Electricidade
RPF	Resettlement Policy Framework
RTE	Round Trip Efficiencies
RTT	Resettlement Task Team
SADC	South African Development Community
SAPP CC	Southern African Power Pool Co-ordination Centre
SCC	Social Cost of Carbon
SDG	Sustainable Development Goal
SEP	Stakeholder Engagement Plan
SFDRR	Sendai Framework for Disaster Risk Reduction
SFP	Strategy to Fight Poverty
SMHI	Swedish Meteorological Hydrological Institute
SPI	Standardised Precipitation Index
STD	Sexually-Transmitted Disease
SR	Scoping Report
SWAPO	South-West Africa People’s Organization
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TB	Tuberculosis
ToR	Terms of Reference
TSS	Total Suspended Solids
TURH	Titles of Use of Water Resources
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNITA	National Union for the Total Independence of Angola
USD	United States Dollar
UXO	Unexploded Ordinance
VAC	Visual Absorption Capacity
VG	Vulnerable Group
VGP	Vulnerable Groups Plan
Vul	Vulnerable Species
W	Watts
WB	World Bank
WCDRR	World Conference on Disaster Risk Reduction
WHO	World Health Organisation
WWTP	Waste Water Treatment Plant

1 Introduction

1.1 Purpose of this document

The Southern African Power Pool Co-ordination Centre (SAPP CC) has appointed Aurecon South Africa (Pty) Ltd (Aurecon) to conduct the Environmental and Social Impact Assessment (ESIA) process for the ANNA Transmission Interconnection Project.

The Environmental and Social Impact Assessment (ESIA)[1] documentation for the Angolan portion of the Angola–Namibia Transmission Interconnector (ANNA) Project is divided into three volumes: Volume I consists of the Non-Technical Summary (NTS), Volume II comprises the ESIA Report, and Volume III constitutes the Environmental and Social Management Plan (ESMP) (this document).

The aim of the project is to alleviate the current electricity supply constraints and to contribute towards the security of energy supply by enhancing the distribution of electricity in the region. From its conception, the ANNA project has had the objective of promoting the highest positive economic, social and environmental impact possible whilst ensuring that all negative social and environmental impacts are addressed by avoiding negative impacts, or where they can't be avoided, minimising and compensating over and above the estimated impacts. This philosophy aims to ensure that the project attains a net positive social and environmental impact and contributes to the overall sustainable development of Angola and Namibia. These considerations were included in the initial conception of the project by means of selecting a route for the transmission line corridor that would avoid all identified sensitive environmental and social resources, as much as possible.

The project is intended to link the Namibian and Angolan electricity networks in the north-western part of Namibia and in the southern part of Angola, initially supplying power to towns in the southern part of Angola, mainly Xangongo, Cahama and Ondjiva, as well as to provide for the future integration of 400 Kilovolt (kV) line(s) from the proposed Baynes Power Station[2]. Anticipated economic benefits include unlocking cheaper energy generation sources across the region, improved access to renewable energy sources (with lower emissions), reduced cost of transmission (due to an increase in transmission route options) and a reduced risk of supply interruptions to both countries. These objectives combined contribute towards the United Nations Development Programme (UNDP) Sustainable Development Goals (SDGs), as discussed in Section 3.3.4 of the ESIA report (Vol. II) and demonstrates progress towards the additional objective of climate co-benefits. The project design also included the applicable mitigation and adaptation measures, in order to minimise its vulnerability to climate change and increase its resilience.

This ESMP is restricted to the Angolan portion of the ANNA Project. Further detail regarding the project context and impact assessment process can be found in the ESIA Report (Volume II). Other key documents to be cross-referenced with this ESMP include the Stakeholder Engagement Plan (SEP), the Vulnerable Group Plan (VGP) and the Resettlement Policy Framework (RPF), all of them presented as Annexures to this ESMP. Separate ESIA documentation, with all supporting plans and specialist reports, was compiled for the Namibian part of the line to respond to the specific requirements of this country's ESIA process legislation.

[1] Although referred to as an ESIA process internationally, the terminology used in the Angolan legislation is "Environmental Impact Assessment (EIA) process", and, in order to maintain consistency throughout this report, the term ESIA process will be used.
[2] Planned on the Kunene River downstream of Ruacana.

1.2 Objectives of the Environmental and Social Management Plan (ESMP)

This report is the Environmental and Social Management Plan (ESMP) for the Angolan portion of the proposed ANNA project. The report was compiled in accordance with Angolan environmental legislation. The procedure for the ESIA process of the project in Angola will comply with their local requirements, namely: the Environmental Framework Law (Law no. 5/98, of 19 July); Environmental Impact Assessment (Decree no. 51/04, of 23 July) regulations; Environmental Licensing Process (Decree no. 59/07, of 13 July); and further auxiliary legislation and associated EIA Regulations.

The ESIA process is initiated in Angola by means of a project registration that includes a screening phase in which the project's characteristics are assessed to evaluate whether these are included in the list of activities that require an Environmental Licence, prior to applying for any other licence. As per legal requirement in Angola, after this phase, the EIA report is submitted to the Impact Assessment Authority (DNPAIA[1]) within the Environmental Ministry (MINAMB[2]) for consideration and approval. In Angola, the scoping phase is not included in the ESIA process. However, international best practice shows that this stage of the ESIA process forms a crucial part of stakeholder engagement, as well as helping to promote the mitigation of potential negative impacts, and the enhancement of expected positive project outcomes.

An ESMP is a key output of the ESIA process and has been compiled in accordance with the requirements of the Angolan Environmental Legislation, the International Finance Corporation (IFC) Performance Standards, the Development Bank of Southern Africa (DBSA) and SAPP Guidelines, as well as other national legislation pertaining to environmental management.

The purpose of this ESMP is to provide a framework within which the environmental and social risks and liabilities, identified during the development of the ESIA, are to be managed during the project lifecycle, and sets out how the project will mobilise resources to implement these measures. The ESMP has the following key objectives:

- Ensure that the project objectives of promoting the highest positive economic, social and environmental impact possible, support Angola's sustainable development and contribute to climate change mitigation and adaptation, thus promoting local communities' environmental and social resilience are attained;
- Ensure compliance with relevant regulations, environmental good practice and commitments made in the ESIA Report (Volume II);
- Communicate key environmental and social expectations, requirements and commitments to all role-players;
- Carry forward, and set out, the measures identified in the ESIA Report to mitigate key environmental and social impacts during the construction and operational phases of the project;
- Establish systems to identify and prevent adverse environmental, social and economic impacts that may arise from project;
- Set out the roles and responsibilities for key role-players responsible for the implementation of the ESMP;
- Set out the environmental and social management activities and monitoring requirements for the various phases of the project; and
- Ensure that there is sufficient allocation of resources to the project to implement the ESMP-related activities.

The ESMP is a living document and must remain relevant to the project as and when the scope evolves in subsequent phases of the project. Thus, the specifications or requirements in this ESMP may need to be taken under review and amended to ensure its continuing applicability to the project. It is recommended that the ESMP be thoroughly reviewed every five years and that this should include the identification of

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[1] Direcção Nacional de Prevenção e Avaliação de Impactes Ambientais - National Direction for Prevention and Assessment of Environmental Impacts

[2] Ministério do Ambiente

additional environmental and social risks that may have emerged since the commencement of the project, and the development of appropriate mitigation measures to manage such additional risks; review of the contribution to building environmental and social resilience and the success of adaptation to climate change; also the promotion of biodiversity conservatione

This ESMP shall form part of the contract and be supplementary to tender documentation, as all contractors must comply with its commitments and requirements, and they must price for compliance and implementation of these requirements where necessary. While RNT will hold the project's Environmental Licence and the responsibility for the implementation of the ESMP, it is recognised that practical implementation of many of the measures may rest with contractors and sub-contractors and, consequently, RNT will require the implementation of a robust review/audit programme to ensure that such measures are indeed executed on its behalf.

1.3 Structure of the ESMP

The ESMP includes the following sections:

- Section 1: Introduction – Sets out the purpose of the ESMP and the objectives of the document, as well as its structure.
- Section 2: Project summary – Summarises the ANNA Transmission Interconnector Project, and its components and proposed activities throughout its lifecycle.
- Section 3: Legislation and policy framework – Lists relevant national legislation, SAPP policies and international framework for compliance, namely the IFC and DBSA requirements. It describes the relevance for the project and where in this document the provisions are included.
- Section 4: Roles and responsibilities - Sets out the roles and responsibilities of the various parties involved in the execution of the project.
- Section 5: Environmental and social management – Provides the approach to the environmental and social management and provides detailed plans to address each of the aspects and impacts identified as requiring mitigation measures.
- Section 6: Training and environmental awareness – Describes the proposed training for various parties to ensure that they are equipped to execute the ESMP, based on their roles, as well as training for communities to raise awareness regarding project activities.
- Section 7: Emergency preparedness and response – Includes a framework plan for identifying risks and procedures so that the relevant parties are prepared in their response.
- Section 8: Grievance mechanism – Describes the proposed Grievance Mechanism to be implemented for the project lifecycle.
- Section 9: Budget for ESMP implementation - Includes the estimated capital and recurrent costs to enable the implementation of the ESMP.
- Section 10: ESMP reporting, monitoring and auditing – Provides the process for regular monitoring, audit and review of the ESMP for improvement of performance, where relevant.

2 Project summary

2.1 Project objectives

SAPP has identified the Angola-Namibia Transmission Interconnector (ANNA) Project as one of its key energy pool initiatives. The aim of the project is to alleviate the current electricity supply constraints and contribute to the security of power supply by reinforcing electrical distribution infrastructure in the region. The project is intended to link the Namibian and Angolan electricity networks in the north-western part of Namibia and the southern part of Angola, initially supplying power to towns in the southern part of Angola, mainly Xangongo, Cahama and Ondjiva, but also to make provision for the future integration of 400 kV line(s) from the proposed Baynes Hydro-power Facility. Anticipated economic benefits include unlocking more affordable energy generation sources across the region, improving access to renewable energy sources (with lower emissions), reducing the cost of transmission (due to an increase in transmission route options) and reducing the risk of supply interruptions to both countries.

2.2 Project timeframes

The construction phase is expected to take 24 - 36 months (for the project in entirety that includes the Namibian component), but this would vary depending on the weather conditions at the time of construction and the construction method proposed by the contractor. Phasing may allow activities to happen in different locations concurrently. The operational lifespan of the project is 30 years.Project location and components

The transmission line in Angola starts at the proposed Lubango substation, north-east of the town of Lubango, from where it runs east for ±6.5 km, and then turns in a south-easterly direction for ±65 km. The route then heads south south-west, bypassing the Bicuar National Park, for a distance of ±93 km, whereafter it meets the Lubango-Cahama road, at a point near Capanda, and follows its course for approximately for ±35.5 km until it reaches Cahama. Near Cahama it will proceed west until it reaches the proposed Cahama substation. After exiting the Cahama substation, the line runs south-east for ±91 km and then turns south-west for another ±40 km, whereafter it reaches the Namibian border.

The proposed stretch of transmission line in Namibia is expected to run parallel with, and to the east of, the existing 330 kV transmission line, which runs from Omburu to Ruacana, as well as the existing 66 kV transmission line that runs north from Ruacana. The proposed 400 kV line would be offset by 60 m from these existing lines (refer to Figure 2.1).

The project is currently in the concept design phase and the detailed design is not yet available. The project components are summarised in Table 2.1 below, and more information can be found in the ESIA Report (Vol. II).

Table 2.1: Project components

Component	Description
Pylons	Type: FAA Suspension Tower; YAL Suspension Tower; YAS Suspension Tower; YAA Suspension Tower. Larger pylons will be used for > 800 m Kunene River crossing Spacing: 300 m to 500 m Height: Between 54.5 m and 24 m Footprint: 12 m x 10 m Foundation maximum depth: 5 m Safety clearance (obstacles): 20 m Additional features: Bird diverters and anti-climbing mechanisms
Conductors	Triple Sorbus AAAC conductor
Overhead line	332 km of 400 kV Single Circuit Transmission Line

Component	Description
Servitude	Width: 55 m Safety clearance (obstacles): 9 m
Access roads	Local and existing tracks to be used where possible, with further new access roads required in the servitude where necessary for access and inspection purposes. Type: Dirt track, with limited earthworks for erosion prevention where necessary, paved only if necessary (e.g. for steep sections).

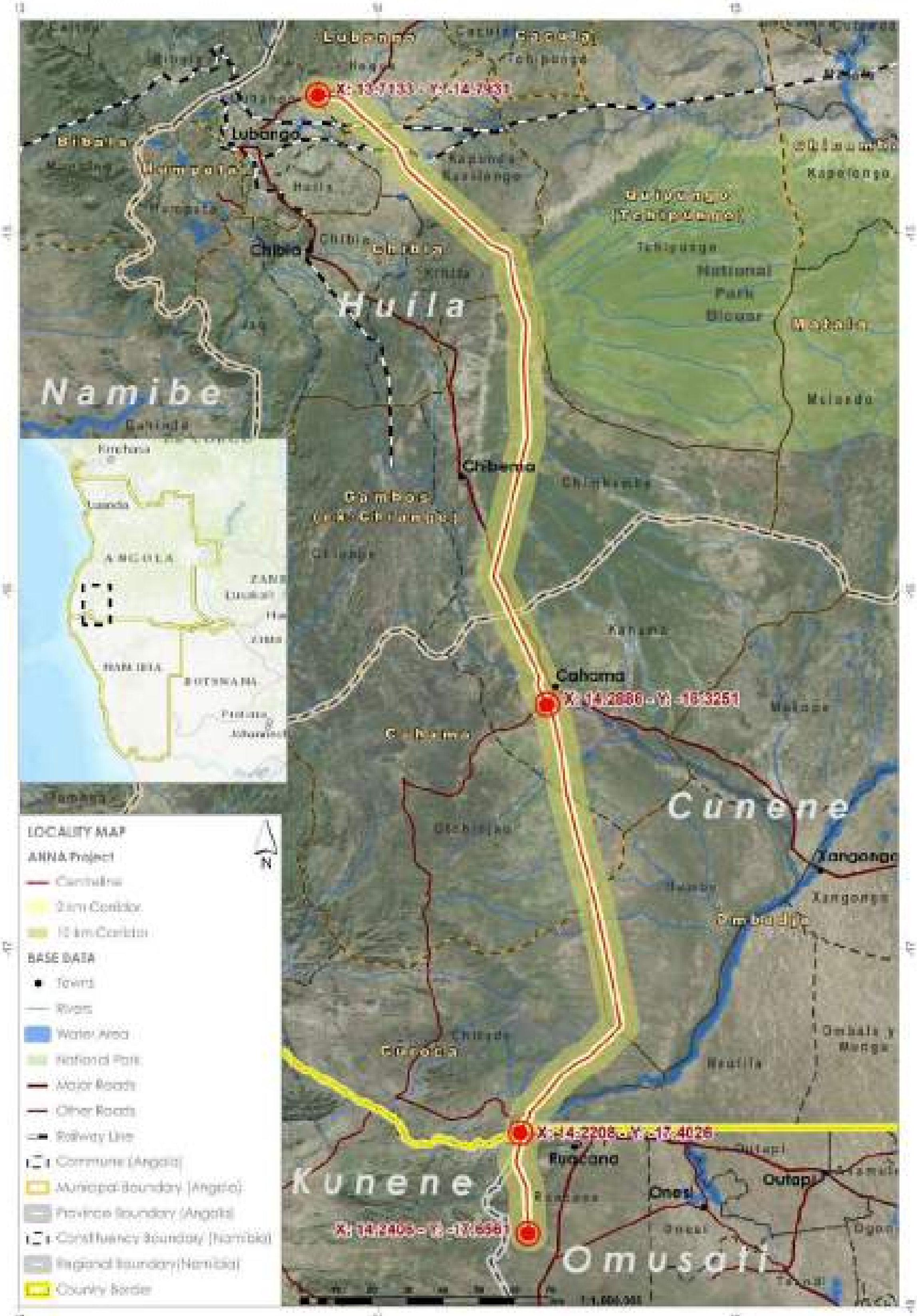

Figure 2.1: Locality map for the entire ANNA Project

2.3 Project activities

The project involves project activities, per phase, as summarised in Table 2.2.

Table 2.2: Project activities per phase

Pre-construction	Construction
1. Resettlement planning: • Establish Resettlement Task Team (RTT) • Announce the project • Identify impacts • Census including socio-economic survey • Undertake inventory of assets • Develop compensation framework and identify livelihood restoration • Prepare detailed budget (valuation), implementation schedule and organisational responsibilities • Stakeholder engagement 2. RAP implementation: • Stakeholder engagement • Household consultation • Signing of contracts • Payment of compensation • Resettlement activities (e.g. relocations) 3. Demining activities 4. Walk-down survey to inform preferred alignment 5. Detailed survey to fix alignment (as informed by resettlement process, with avoidance of assets and livelihood features as a priority) 6. Servitude application, where required 7. Land acquisition process 8. Check survey for exact pylon locations 9. Geotechnical investigation of selected substation and pylon locations to inform foundation design 10. Final designs 11. Review of this ESMP in order to ensure that the proposed environmental and social management and associated monitoring is targeted to the activities and construction methods to be implemented by the Contractor	1. Environmental and social awareness training of all staff involved in the implementation of this ESMP, all construction workers and potentially affected communities (Section 6) 2. Mobilisation of workers, machinery and construction equipment 3. Survey and development of access roads 4. Clearing of vegetation and stripping of the topsoil in the construction camp/s, construction site/s, servitude, Cahama substation and at each pylon location 5. Setup of construction camp/s (approx. 15-20 camps of 0.5 ha each) to include: • Site office, accommodation (if required), eating and ablution facilities • Laydown areas for infrastructure • Concrete batching plant • Storage facilities for materials, equipment or waste • Equipment parking/storage area • Power supply (generator) • Fuel storage for generators and vehicles • Water supply (borehole or water treatment plant, or a water tank) • Security fencing • Mobile toilets and/or French drains for treated sewage disposal 6. Transport required materials, equipment and components to the camp/s and to each pylon location 7. Movement and operation of heavy machinery and equipment 8. Waste production and management 9. Clearing trees from the right-of-way 10. Surveying and pegging of pylon locations 11. Earthworks associated with the pylon and substation foundations/platforms 12. Construction of concrete foundations to support substations and pylons (including installation of stay-cables to attach to the ground, and support bases) 13. Building and assembling of all the required equipment and structures inside the substation areas (usually undertaken by highly-qualified teams), including associated buildings and security fencing 14. Assembly and erection of pylons using temporary laydown areas at each pylon 15. Laying of cables, line signalling, aerial beacons and bird diverters, which entails unrolling, adjusting and securing of the cables using the areas around the

Pre-construction	Construction
	pylons or between the pylons and, if crossing over or beneath obstacles (namely roads, rails and other aerial lines), the setup of temporary protective structures 16. 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 17. Conductor and Optical Ground Wire (OPGW) stringing 18. Installing of anti–climbing devices on the towers 19. Demobilisation of construction work sites 20. Rehabilitation of the affected areas: • 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 21. Resettlement follow-up: • After project community support, including Grievance Mechanism • Monitoring, evaluation and reporting 22. Environmental and social management and monitoring of the construction works (Section 5)
Operation and Maintenance	**Decommissioning (if required)**
1. General operation of the transmission line (physical presence and functional characteristics) 2. Periodic inspections, monitoring, maintenance of the line, entailing the verification of the state of the conductors and structures (and replacement of components, if damaged), and assessment of the compliance with safety distances between the vegetation and the conductors 3. Vegetation management along the servitude, e.g. cutting and pruning of trees, selective herbicide application, mechanical and manual bush clearing 4. Periodic maintenance activities at the substations, which includes cleaning insulators, checking circuits, testing batteries, replacing transformer oils, etc. 5. Waste production and management, associated with the periodic maintenance actions (limited to pylon footprints and substation interiors) 6. Environmental and social management and monitoring throughout the project's life time (Section**5**) 7. Resettlement follow-up: • After project community support, including Grievance Mechanism • Monitoring, evaluation and reporting	1. Stakeholder engagement to capture communities' perspectives on the land use after decommissioning 2. Decommissioning plan to be compiled, based on conditions at that time 3. Dismantling and removal of transmission cables and pylons 4. Rehabilitation of pylon foundations and other disturbed areas 5. Transport and disposal of the material off-site 6. Monitoring (site surveys) may be required after rehabilitation has been completed. This is to ensure that the rehabilitation objectives were met and that the rehabilitation process was successful.

The construction phase is expected to take 24-36 months, but this can vary depending on the weather conditions at the time of construction, as well as on the construction method proposed by the Contractor.

Work will not necessarily be undertaken in a linear sequence, as most of the activities can be undertaken concurrently and in parallel, depending on the phasing of construction.

3 Legal and Policy Framework

This section provides an overview of the legal and policy documents and guidelines applicable to the ESIA process for the proposed ANNA Project, specific to the Angolan portion of the proposed transmission line corridor.

The overarching legislation applicable in Angola is the Environmental Framework Law, (Law no. 5/98, of 19 June) and associated EIA Regulations (refer to Section 3.1). As a donor-funded, transboundary project, the ESIA process needs to comply with national legislation, IFC Performance Standards and the World Bank Environmental and Social Framework (World Bank, 2017). The IFC Performance Standards (IFC, 2012)[1] are designed to ensure that financed projects are carried out in an environmentally and socially responsible manner and are linked closely with the DBSA Environmental and Social Safeguards (ESS). The applicability to international guidance is provided in Section 3.3.

3.1 National legislation

The legal framework pertaining to the development of the ESIA documentation includes, but is not limited to, the legal documents identified in Table 3.1.

Table 3.1: List of relevant legislation at national level

Legal Document
Climate Change
National Strategy for Climate Change 2018-2030
Environment
Law no. 5/98, of 19 June, Environmental Framework Law
Decree no. 59/2007, of 13 July, Decree on Environmental Licencing Process
Decree no. 51/2004, of 23 July, Regulation on the Environmental Impact Assessment (EIA) process
Executive Decree no. 86/12, of 23 February, Regulation on the Technical Registration for Environmental Consulting Societies/Companies
Decree no. 302/2016, of 30 June, Regulation on the Classification of Environmental Consulting and Auditing Societies/Companies
Executive Decree no. 92/12, of 1 March, Terms of Reference (ToR) for the Environmental Impact Assessment Report/Study
Executive Decree no. 87/12, of 24 February, Regulations for Public Consultation for projects subjected to EIA process
Joint Executive Decree no. 96/09, of 6 October, approves the taxes applicable to the EIA process
Decree no. 1/10, of 13 January, on Environmental Auditing
Presidential Decree no. 194/11, of 7 July, on Environmental Damage Liability
Energy
Law no. 14-A/96, of 31 May, amended by Law no. 27/15, of 14 December, General Law on Electricity
Decree no. 47/01, of 20 July, Regulations for Energy Production
Presidential Decree no. 256/11, of 29 September, approving the National Policy and Strategy for Energy Security
Land Use and Regional Planning
Law no. 3/04, of 25 June, Law on Territorial and Urban planning
Law no. 9/04, of 9 November, Land Law
Decree no. 2/06, of 23 January, General regulation on the Territorial, urbanistic and rural plans (REPTUR)
Presidential Decree No. 216/11, of 8 August, National Policy for Land Concession Rights
Law no. 1/11, of 14 January, Basic General Regime of the National Planning System
Presidential Decree no. 214/15, of 08 December, approving the National Strategic Plan for Territorial Management (PLANEAT) 2015-2025

[1] International Finance Corporation. 2012. IFC Performance Standards on Environmental and Social Sustainability. IFC: Washington DC.

Legal Document
Water
Law no. 6/02, of 21 June, Water Law
Presidential Decree no. 261/11, of 6 October, Regulation on Water Quality
Presidential Decree no. 141/12, of 21 June, Regulation for the prevention and control of pollution in national waters
National Health Development Plan 2012-2025
Presidential Decree No. 9/13, of 31 January, approving the National Water Strategic Programme (PNEA) for the period 2013-2017
Presidential Decree No. 82/14, of 21 April, Regulation of General Use of Water Resources
Presidential Decree No. 126/17, of 13 June, National Water Plan
Waste Management
Presidential Decree no. 190/12, of 24 August, Regulation on Waste Management
Executive Decree no. 17/13, of 22 January, on the waste management of residues resulting from building and demolition activities
Flora, Fauna and Conservation Areas
Resolution no. 42/06, of 26 July, National Strategy and Cation Plan for Biodiversity
Resolution no 1/10, of 14 January, National Policy on Forests, Wildlife and Conservation areas.
Presidential Decree no. 46/14, of 25 February, approving the National Action Programme to fight Desertification (PANCOD)
Resolution No. 27/16, of 22 July, implementing the Convention on Wetlands
Executive Decree no. 433/16, of 26 October, validating the Certificate of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
Law no. 6/17, of 24 January, Forest and Wildlife Law
Executive Decree no. 252/18, of 13 July, approves the Red List of Species for Angola
Presidential Decree no. 171/18, of 23 July, Forestry Regulation
Heritage
Law no. 14/05, of 7 October, Cultural Heritage Law
Decree no. 2/06, of 23 January, on the Architectural and Archaeological Patrimony
Social issues and protection of vulnerable groups
Resolution no. 9/04, of 4 June, National Strategy for Combating Poverty.
Presidential Decree no. 222/13, of 24 December, on the National Policy for Gender Equality and Equity
Law no. 25/12, of 22 August, Child Protection and Integral Development Framework Law
Presidential Decree no. 158/18, of 29 June, approves the National Development Plan 2018-2022
Indigenous People
There are no specific references to indigenous peoples or minorities in the Constitution, nor in other domestic law. The Government of Angola does not recognise the concept of indigenous peoples, as affirmed in international law. Despite this, Angola has been a signatory to International Labour Organisation (ILO) Convention 107 on Indigenous and Tribal Populations since 1976, albeit with very limited reporting[1].

3.2 Regional Policies and Agreements

Relevant regional policies and guidelines are presented in Table 3.2 below.

Table 3.2: Relevant policies and guidelines and their applicability

Policy Requirements	
Policy considered	**Applicability**
SAPP Environmental and Social Management Framework (2018)	General applicability in terms of guidance on, *inter alia*, stakeholder engagement, specialist terms of reference, and the identification of impacts, risks and mitigation measures.
SAPP ESIA Guidelines for Transmission Infrastructure (2010)	General applicability in terms of guidance on, *inter alia*, recommended format and components of an ESMP, approach to

[1] Fundo De Apoio Social (FAS), 2017

Policy Requirements	
Policy considered	**Applicability**
	stakeholder engagement, identification of impacts, mitigation measures and monitoring.

3.3 International financial institution standards and policies

3.3.1 Standards

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 social 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 (IFC PS) provide guidance on how to identify risks and impacts and are designed to help projects avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable manner.

The DBSA is a multilateral development finance institution that funds infrastructure development in the SADC region. It aims to promote sustainable development and improve the quality of life of people, supports economic growth and regional integration, and promotes the sustainable use of scarce resources. The DBSA has issued an update to the Environmental and Social Safeguards Standards (ESSS) (DBSA. 2018). These ESSS are used by the DBSA to manage social and environmental risks as part of its investment decision-making.

The IFC PS and the DBSA ESSS are included in Annexure C of the ESIA Report (Vol. II), along with their relevance and applicability to the project. The ESIA Report also includes a financial safeguard gap analysis of the project against these PS and ESSS.

The latest DBSA ESSS was issued in 2018 (DBSA. 2018) and are listed below:

- ESSS1: Assessment and Management of Environmental and Social Risks and Impacts
- ESSS2: Stakeholder Engagement and Information Disclosure
- ESSS3: Gender Mainstreaming
- ESSS4: Indigenous Peoples
- ESSS5: Land Acquisition, Land Use Restrictions and Involuntary Resettlement
- ESSS6: Labour and Working Conditions
- ESSS7: Community Health and Safety
- ESSS8: Cultural Heritage
- ESSS9: Biodiversity Conservation and Sustainable Living Natural Resources Management
- ESSS10: Resource Efficiency, Pollution Prevention and Management
- ESSS11: Safety of Dams (not applicable to this project)

The IFC PS (2012) are listed below:

- PS1: Assessment and Management of Environmental and Social Risks and Impacts
- PS2: Labour and Working Conditions
- PS3: Resource Efficiency and Pollution Prevention
- PS4: Community Health, Safety and Security

- PS5: Land Acquisition and Involuntary Resettlement
- PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- PS7: Indigenous Peoples
- PS8: Cultural Heritage

3.3.2 Environmental, Health, and Safety Guidelines

The IFC's Environmental, Health and Safety (EHS) Guidelines (IFC, 2007a) 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, the 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 when using existing technology at a reasonable cost.

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, 2007b) are relevant to the proposed project. Table 3.3 includes the IFC General and industry-specific EHS Guidelines and their applicability to the project.

Table 3.3: Applicability of IFC Environmental, Health, and Safety General Guidelines (2007)

Sub-section	Description of the guidance	Applicability to the project
	Environment	
1.1 **Air Emissions and Ambient Air Quality**	• Projects with significant sources of air emissions, and potential for significant impacts to ambient air quality, should prevent or minimise impacts by ensuring that: • Emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence, the current World Health Organisation Air Quality Guidelines, or other internationally recognised sources; • Emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards. The Guideline suggests 25% of the applicable air quality standards to allow additional, future sustainable development in the same airshed.	• The project is an electricity transmission project that will transmit electricity from mainly renewable resources (hydro-electricity). Therefore, minimal emissions are expected to occur during the lifecycle of the project. • Exceedance of IFC or WHO thresholds is not expected due to the temporary nature of the works, the state of the airshed (being a rural area with no significant pollution sources) and the linear nature of the project (versus a point source). However, generic measures are included in Section 5.3.4 to minimise any impacts from dust and vehicle emissions.
1.2 **Energy Conservation**	• Applicable to projects that consume energy in process heating and cooling; process and auxiliary systems, such as motors, pumps, and fans; compressed air systems and heating, ventilation and air conditioning systems (HVAC); and lighting systems. The aim is to reduce energy consumption though adopting the guidance provided.	• Relevant design-related or behavioural measures applicable during construction are included in Section 5.3.17.

Sub-section	Description of the guidance	Applicability to the project
1.3 Wastewater and Ambient Water Quality	• Projects with the potential to generate process wastewater, sanitary (domestic) sewage, or stormwater should incorporate the necessary precautions to avoid, minimise, and control adverse impacts to human health, safety, or the environment. Guidance is proposed in this regard.	• Applicable to the proposed project only in so far as construction camps will have domestic wastewater discharges. • Measures to limit impacts of contaminated water generated during construction are included in Section 5.3.2.
1.4 Water Conservation	• Water conservation programmes should be implemented commensurate with the magnitude and cost of water use. Such measures may include water monitoring/management techniques; process and cooling/heating water recycling, reuse, and other techniques; and sanitary water conservation techniques. Guidance is proposed in this regard.	• Not applicable to the proposed project, since it is an electricity transmission project, which does not consume water. The only water consumption will be during construction, in the camps and for the concrete foundations. • Measures to limit water usage required during construction are included in Section 5.3.17.
1.5 Hazardous Materials Management	• This guidance is applicable to projects that use, store, or handle any quantity of hazardous materials (Hazmats). The overall objective of hazardous materials management is to avoid or, when avoidance is not feasible, minimize uncontrolled releases of hazardous materials or accidents (including explosion and fire) during their production, handling, storage and use. It is twofold and relates to General Hazmat Management; as well as Management of Major Hazards: Additional guidance where hazardous materials are stored or handles above, threshold quantities.	• It is anticipated that some dangerous goods/ hazardous materials (such as fuels needed during the construction phase) will be temporarily stored on site, as the Angolan section of the transmission line is approximately 331 km long. Refuelling and supplies would occur, and be obtained, in the nearest towns such as Lubango, Chibia, Cahama, Xangongo, depending on the distance to the construction camp, and then stored on site. As such, measures have been included in Section 5.3.8 when there is the need to store fuel in the construction camps (i.e. fuelling small plant such as generators and compressors). • Should there be the need to use pesticides during servitude maintenance, the guidance for their use is provided for in Section 5.3.8.
1.6 Waste Management	• This guidance is applicable to projects that generate, store, or handle any quantity of waste across a range of industry sectors. Guidance for general and hazardous waste management is provided.	• Engineers and contractors are to incorporate this guidance into their project plans, as and where applicable. • Waste mitigation measures are included in Section 5.3.13.
1.7 Noise	• This guidance is applicable to projects that generate noise beyond the property boundaries. Noise prevention and mitigation measures should be applied where predicted or measured noise impacts from a project facility or operations exceed the applicable noise level guideline at the most sensitive point of reception. Noise reduction measures (from the source) are provided.	• Generation of noise would only occur during the construction phase. Construction noise is expected to be negligible, as it will be temporary in nature and only occur at the construction camps and pylon locations, therefore having a limited area of influence. • Noise mitigation measures are included in Section 5.3.5.
1.8 Contaminated Land	• Land is considered contaminated when it contains hazardous materials or oil concentrations above background or naturally occurring levels. Contamination of land should be avoided by preventing or controlling the release of hazardous	• The project infrastructure does not traverse any known areas of contaminated land. • A waste management plan has been developed and is included in Section 5.3.13.

Sub-section	Description of the guidance	Applicability to the project
	materials, hazardous wastes, or oil to the environment. When contamination of land is suspected or confirmed during any project phase, the cause of the uncontrolled release should be identified and corrected to avoid further releases and associated adverse impacts.	
	2 - Occupational Health and Safety	
2.1 General Facility Design and Operation **2.2 Communication and Training** **2.3 Physical Hazards** **2.4 Chemical Hazards** **2.5 Biological Hazards** **2.6 Radiological Hazards** **2.7 Personal Protective Equipment (PPE)** **2.8 Special Hazard Environments** **2.9 Monitoring**	• Employers and supervisors are obliged to implement all reasonable precautions to protect the health and safety of workers. This section provides guidance and examples of reasonable precautions to implement in managing principal risks to occupational health and safety.	• Engineers and contractors are to incorporate this guidance into their project plans, as and where applicable. • Guidance is to be incorporated into an OHS Plan as part of the Health, Safety and Environment Management System. • Although a dedicated OHS Plan does not form part of the ESIA process, the OHS Plan in Section 5.3.15 incorporates this guidance where relevant to the project, and includes recommendations to protect workers and ensure their welfare. Section 6 refers to potential training requirements.
	3 - Community Health and Safety	
3.1Water Availability and Quantity	• This guidance is applicable where water availability and quantity outside the project boundary may be affected. Drinking water should be protected in terms of water quality, and in terms of water availability, the potential effect of groundwater or surface water abstraction for project activities should be properly assessed through a combination of field testing and modelling techniques, accounting for seasonal variability and projected changes in demand in the project area.	• Any water required during the construction phase will be trucked in from the nearest towns (e.g. Lubango, Chibia, Cahama, Xangongo) or water sources to the construction camps, as required. Alternatively, a borehole in the construction camps may be considered. • The contractor will have to ensure that the drinking water for the workers is of a potable quality. This is included in Section 5.3.2.
3.2 Structural Safety of Project Infrastructure	• The structural safety of the project should be ensured. Reduction of potential hazards is best accomplished during the design phase when the structural design, layout and site modifications can be adapted more easily.	• Engineers are to incorporate this guidance into the project layout and design, where applicable.
3.3 Life and Fire Safety	• All new buildings accessible to the public should be designed, constructed, and operated in full compliance with local building codes, local fire department regulations, local legal/insurance requirements, and in accordance with an	• The proposed development is for the 400 kV ANNA transmission line. Although there is risk of fire due to the electrical nature of the project, the development does not include any buildings that would be accessible to the public.

Sub-section	Description of the guidance	Applicability to the project
	internationally accepted life and fire safety (L&FS) standard.	
3.4 Traffic Safety	• The guidelines are aimed at the prevention and control of traffic-related injuries and fatalities relating to the project.	• Traffic-related issues are not expected due to the remoteness of the area. • Traffic safety measures are however included in Section 5.3.16.
3.5 Transport of Hazardous Materials	• Projects should have procedures in place that ensure compliance with local laws and international requirements applicable to the transport of hazardous materials.	• Contractors should maintain a legal register and must apply guidelines where applicable. • Spills are included in a framework Emergency Preparedness and Response Plan, included in Section 7 (refer to sub-section 3.7 in this table).
3.6 Disease Prevention	• Communicable diseases pose a threat to public health and typically are associated with large development projects. Examples include those relating to poor sanitation and living conditions, sexual transmission and vector-borne infections. Communicable diseases of most concern during the construction phase due to labour mobility are sexually-transmitted diseases (STDs), such as HIV/AIDS. Projects should include interventions to mitigate for such risks.	• It is proposed to use local labour for construction, as far as possible, as included in Section 5.3.11. • HIV/AIDS prevention and education strategies are included in Section 6.4.
3.7 Emergency Preparedness and Response	• All projects should have an Emergency Preparedness and Response Plan that is commensurate with the risks of the facility.	• The compilation of a framework Emergency Preparedness and Response Plan applicable to the level of project design, is included in Section 7.
4 - Construction and Decommissioning		
All sections	• Additional, specific guidance on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities is provided. This cross-refers with other sections above as follows: • Environment (noise and vibration, soil erosion, air quality, solid waste, hazardous materials, wastewater discharge and contaminated land) • Occupational Health and Safety • Community Health and Safety	• The OHS Plan in Section 5.3.15 incorporates this guidance where relevant to the project. • The Community Health and Safety Plan in Section 5.3.14 incorporates this guidance where relevant to the project. • Environmental aspects are considered under the various plans found in Section 5.3.

Table 3.4 shows the EHS Guidelines for Electric Power Transmission and Distribution, applicable to the project.

Table 3.4: IFC Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007)

Section	Sub-section	Description of the guidance	Applicability to the project
1 Industry-specific Impacts and Management	**1.1 Environmental**	• This guideline includes information relevant to power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas. • Guidelines regarding environmental issues during the construction and operation phases of such projects specific to this industry sector are as follows: – Terrestrial habitat alteration – Aquatic habitat alteration – Electric and magnetic fields – Hazardous materials	• Engineers are to incorporate this guidance, where applicable. • Biodiversity mitigation is included in Section 5.3.6. • Waste management is included in Section 5.3.13.
	1.2 Occupational Health and Safety	• Guidelines are provided with regards to occupational health and safety hazards specific to such projects; these include: – Live power lines – Working at height – Electric and magnetic fields – Exposure to chemicals	• The OHS Plan in Section 5.3.15 incorporates this guidance, where relevant to the project.
	1.3 Community Health and Safety	• Other than the general impacts provided for in the General EHS Guidance, the following impacts on community health and safety could occur as a result of such projects: – Electrocution – Electromagnetic interference – Visual amenity – Noise and Ozone – Aircraft Navigation Safety	• Engineers and Contractors are to incorporate this guidance where applicable (refer to Section 5.3.14). • Community health and safety is addressed in Section 5.3.14. It excludes electromagnetic interference, noise and ozone (corona) and aircraft safety, which were scoped out of the impact assessment and/or addressed at the pre-feasibility phase. The necessary stakeholders have been engaged, as included in the ESIA Report (Vol. II). • Landscape and visual mitigation is included in Section 5.3.12.
2 Performance Indicators and Monitoring	**All sections**	• This guideline provides limits and performance indicators for monitoring specifications for such projects including: • General public exposure to electric and magnetic fields • OHS (working distances, exposure of electric and magnetic fields, accident and fatality rates etc.)	• The OHS Plan in Section 5.3.15 incorporates this guidance where relevant to the project.

3.3.3 Environmental and social categorisation

DBSA and IFC use similar classification systems, which categorises projects into one of four environmental assessment categories, as illustrated below.

According to the DBSA (2018), electrical transmission projects are typically listed as Category 2 (Medium risk) projects, as most negative impacts are expected to be reversible with the implementation of prescribed mitigation measures. This categorisation is considered to be an appropriate risk rating for this project, since no critical biodiversity areas, protected areas or areas of dense population, where significant resettlement would be required, are likely to be traversed. This implies that a full Environmental and Social Impact Assessment needs to, and has been, undertaken for the project. More detail on the justification for this categorisation is included in the ESIA Report (Volume II).

4 Roles and responsibilities

The parties responsible for ensuring implementation of this ESMP at the various phases are shown in Table 4.1. They will be involved in various capacities, e.g. implementation, management, supervision, monitoring and compliance auditing.

Table 4.1: Project staff and involvement per project phase

Company / Position	Pre-construction	Construction	Operation	Decommissioning
Environmental Authority				
MINAMB/DNPAIA	✗	✗	✗	✗
Sponsors				
SAPP	✗	✗	✗	✗
Fund administrators (DBSA)	✗	✗	✗	✗
Implementing Agent - RNT				
Project Manager*	✗	✗	✗	✗
Environmental Manager	✗	✗	✗	✗
Stakeholder Manager	✗	✗	✗	✗
Owner's Engineer				
Project Manager*	✗	✗		
Commercial and Control Manager*	✗	✗		
Construction Manager*	✗	✗		
Environmental Manager	✗	✗		
Quality, Health and Safety Manager	✗	✗		
Community Manager	✗	✗		
Engineering, Procurement and Construction (EPC) Contractor				
Environmental Control Officer (ECO)	✗	✗		
Health and Safety Officer	✗	✗		
Community Liaison Officer/s	✗	✗		
Independent ECO	✗	✗	✗	✗
Specialist inputs	✗	✗	✗	✗

* these roles are not developed in detail in this ESMP as they do not form a strategic part of the environmental management of the project.

4.1 Organisational structure

A provisional reporting and communications structure pertaining to environmental and social matters for this project is indicated in Figure 4.1. Note that since this is provisional, it should be subject to review to reflect the contractual realities, once established, as well as specific on-site requirements. Since this ESMP covers the full project lifecycle, the parties relevant to construction are shown in the dashed box.

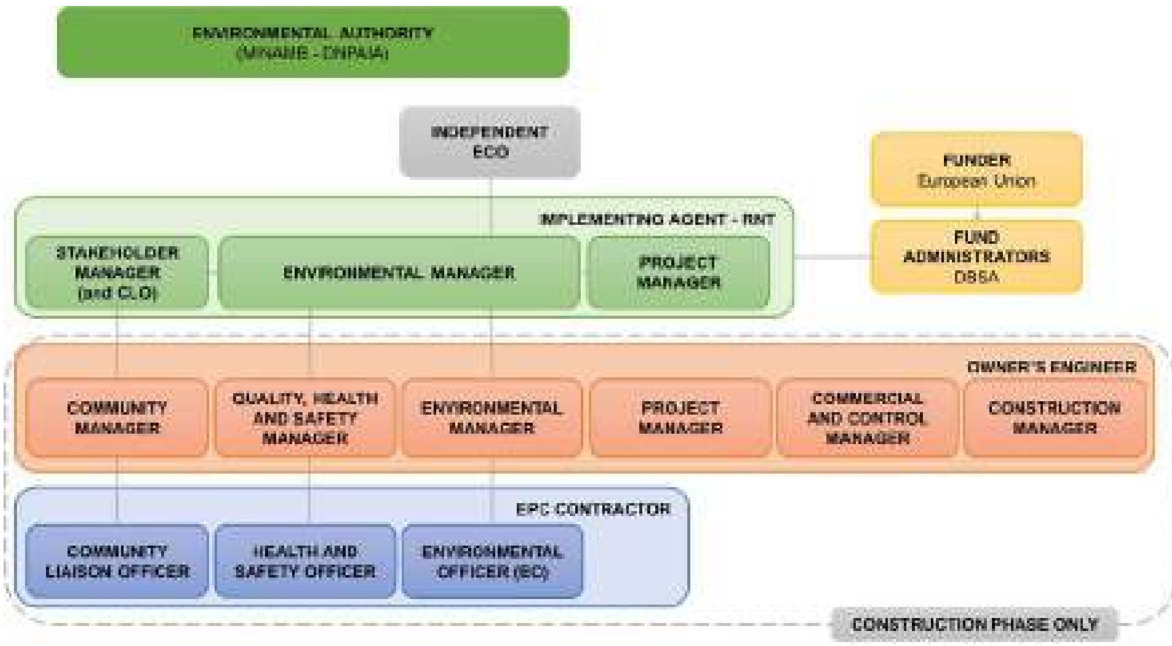

Figure 4.1: Proposed Organisational and Reporting Structure

4.2 Environmental authority

The Angolan Ministry of Environment (MINAMB) is the custodian of Angola's natural environment and exercises this duty through the development, administration and enforcement of environmental legislation and policy. DNPAIA[1] is the environmental authority with jurisdiction over the impact assessment of this project. Their role is to oversee the ESIA process, conduct the ESIA public participation, approve (or reject) the ESIA Report, issue the Environmental Licence (EL) and audit the environmental and social performance of the project.

There are two types of EL: The Environmental Installation Licence and the Environmental Operation Licence. The first precedes the second and the Installation EL authorises the commencement of the construction phase of the project, upon compliance with the conditions of this licence. The Operation EL is issued after all the requirements of the EIA process are met. The Operation EL includes information such as the best applicable technologies; all applicable measures to protect the environment, prevent pollution and manage waste; the threshold values for the project's emissions; the monitoring measures to be implemented; and the validity of the EL, which cannot be shorter than three years or exceed eight years. The EL must be renewed before the end of its validity period, and this renewal is preceded by an Environmental Audit, which is performed by MINAMB.

In summary, DNPAIA's role is to monitor and enforce the implementation of the actions included in this ESMP. Environmental audit reports should be prepared at specific intervals, namely for the renewal of the EL, and the ESMP should then be reviewed and updated to fulfil such requirements.

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[1] Direcção Nacional de Prevenção e Avaliação de Impactes Ambientais - National Director for Prevention and Assessment of Environmental Impacts

4.3 Fund administrators and Funders

The fund administrators and funders are the DBSA and the EU respectively. The ESMP has been compiled to meet the requirements of these parties, through the application of IFC and DBSA standards or safeguards, as well as to satisfy internal reporting requirements for the DBSA. Should additional funders be identified, this ESMP must be reviewed to include any additional reporting requirements.

4.4 Implementing agent (RNT)

The term 'Implementing Agent', in the context of this ESMP, refers to the entity ultimately responsible for the transmission infrastructure. In Angola, this will be RNT. The Implementing Agent will have a direct link with the Funder, the Engineering, Procurement and Construction (EPC) Contractor and the Owner's Engineer, even though it is foreseen that the project will be overseen by the Owner's Engineer during construction, on behalf of the Implementing Agent. The Implementing Agent must appoint and designate qualified personnel to execute, co-ordinate and oversee the implementation of the project, as well as the operation of the project, and to ensure compliance with this ESMP. With regards to operation this includes managing of external sub-contractors appointed for maintenance activities and ensuring their compliance with the ESMP.

The Implementing Agent also has the responsibility of developing an Environmental and Social Management System (ESMS) which will include all of the recommendations within this ESMP.

4.4.1 Project Manager

The Project Manager will have overall responsibility for the management of the project. The Project Manager must ensure that all stipulations of the ESMP and conditions of the Environmental Licence (EL), relevant permits and licences are communicated and adhered to by RNT and its Contractor(s). The Project Manager must also ensure that periodic environmental audits are undertaken on the project implementation.

During construction, the Owner's Engineer will report to the Project Manager and will have the overall responsibility to oversee daily site works, and to liaise with the Contractor from the Implementing Agent's perspective.

During operation, the Project Manager must ensure that RNT and external sub-contractors remain in compliance with the requirements of the ESMP, through regular communication and monitoring.

4.4.2 Environmental Manager

The 'Environmental Manager' is the party responsible for sustainability and environmental management within the Implementing Agent. The Environmental Manager will be more active in the operational phase of the project, as the environmental management of the Owner's Engineer will fulfil many monitoring responsibilities during the construction phase. It is possible that a representative from RNT's Quality, Safety, Health and Environment[1] Management Support Offices can fulfil this role. The role of the Environmental Manager is as follows, and extends beyond the scope of this ESMP, as it involves Environmental and Social Management System (ESMS) activities as well:

- Ensure that the project objectives of promoting the highest positive economic, social and environmental impact possible, support Angola's sustainable development and contribute to climate change mitigation and adaptation, thus promoting local communities' environmental and social resilience are attained;
- Develop and manage the implementation of a broad-based sustainability strategy and plan.
- Integrate the sustainability strategy throughout the responsible company.

[1] Qualidade, Segurança, Saúde e Ambiente (QSSA)

- Ensure that the sustainability strategy and plan enhances business performance and supports the long-term interests of the company.
- Develop and implement the ESMS that adheres to local, national and international standards;
- Manage the support team of environmental, health and safety and community officers to implement the ESMS.
- Review the ESMP at various stages in the project lifecycle and ensure that it complies with the objectives, requirements, targets and indicators set in this document (refer to Section 10.4).
- Ensure compliance with relevant environmental and social legislation.
- Prepare monitoring reports for submission to the General Manager, as well as to stakeholders and the relevant authority.
- Ensure integration of environmental and social functions throughout the operation.
- Ensure implementation of the Grievance Mechanism and manage the environmental-related components of the Grievance Mechanism.
- Implement environmental and social policies, procedures, and management plans.
- Review and analysis of monitoring results, and preparation of reports to management and stakeholders.
- Planning of, and carrying out, environmental and social training and awareness programs for employees and contractors.
- Obtaining and maintaining all necessary environmental and social permits in liaison with the legal service.
- Inspections/audits of environmental and social protection requirements by employees and sub-contractors.
- Sampling and data capture in accordance with the environmental and social monitoring program, and analysis of the results.
- Compile Global Reporting Initiative (GRI) data for inclusion in the annual report.
- Conduct environmental and social risk assessment for the operation.
- Ensure that there is adequate capacity to implement sustainability, environmental and social management functions and responsibilities.
- Outsource functions as required, to meet obligations and ensure compliance.

4.4.3 Stakeholder Manager

The Implementing Agent must appoint a 'Stakeholder Manager' to assist with developing and maintaining relationships with communities in and around the project area. It is possible that a representative from representative from RNT's Quality, Safety, Health and Environment Management Support Offices can fulfil this role.

The Stakeholder Manager will be more active in the operational phase of the project, as the Community Management team of the Owner's Engineer will fulfil many monitoring responsibilities during the construction phase, with appointed Social Specialists managing the implementation. They are able to provide insight and local knowledge, which enhances the Implementing Agent's ability to manage a range of risks and uncertainties, and they are also a familiar and accessible point of contact with whom community members can raise concerns, realise opportunities and resolve grievances. Their role includes the following:

- Act as the primary point of contact between affected communities and the Implementing Agent.
- Develop and maintain relationships with local community stakeholders.
- Implement social policies, procedures and management plans, notably the Stakeholder Engagement Plan (SEP), the Vulnerable Groups Plan (VGP), the Resettlement Action Plan (RAP) and other social components of the ESMP.
- Establish, and overall management, of the Grievance Mechanism, in conjunction with the environmental, and health and safety co-ordinators, and in liaison with the Human Resources Manager, as well as with the Owner's Engineer.

- Plan and carry out social and stakeholder engagement training programmes for employees.
- Assist with stakeholder engagement and awareness training and build relationships with local community stakeholders.

During operation specifically, the following should be undertaken to ensure continuity with previous phases:

- Appoint Community Liaison Officer/s (CLO/s) to follow on from the Contractor's CLO/s' responsibilities, and provide training if required.
- Communicate with the communities through the CLO/s in order to provide information on maintenance activities and the scheduling thereof.
- Implement the grievance procedure in order to address grievances lodged by the project-affected communities.
- Monitor the implementation of the Social Management Plans and Community Awareness Training.
- Identify shortcomings or inappropriate actions taken as part of operation, and propose corrective measures or alternative actions.

4.5 Owner's Engineer

The project construction will be overseen by the Owner's Engineer on behalf of the Implementing Agent. The Owner's Engineer will be accountable for the management of the EPC Contractor on behalf of the Implementing Agent. The Owner's Engineer will have the following key functions:

- Environmental Management
- Community Management
- Project Management
- Commercial and Control Management
- Construction Management
- Quality, Health and Safety Management

The Owner's Engineer will interact with the EPC Contractor on behalf of the Implementing Agent. All formal communication between the EPC Contractor and the Owner's Engineer will be through the Implementing Agent. The Funder will interact directly with the Implementing Agent and will not have a direct link with the Owner's Engineer and the EPC Contractor.

The Owner's Engineer will have discipline specialists and resident engineers to provide the required technical capabilities required for the overall project. The resident engineers and technical specialists report to the Construction Manager, who will ensure that the expertise is located as and when required, with minimal interruption of activities on alternative sites. This process also facilitates a platform for successful information transfer from the site office and the project office. The specialists and resident engineers also have inputs into the Project Management, Control and Commercial Management, and the Quality, Health and Safety Management functions.

4.5.1 Environmental Management

4.5.1.1 Environmental Manager

The function of the Owner's Engineer's Environmental Manager is to supervise and monitor the compliance of the EPC Contractor during the construction period in accordance with the conditions of the EL and this ESMP.

The Environmental Manager will be supported by a team of Owner's Engineer's Environmental Control Officers (ECOs) managed and distributed on the site according to the needs of the project and the construction schedule.

4.5.1.2 Environmental Control Officer (ECO)

The Environmental Control Officer (ECO) is responsible for monitoring and supervising all activities and behaviours on a site to verify if the work undertaken by the EPC Contractor complies with the requirements of the conditions as stipulated in the EL, as well as the requirements as outlined in the ESMP. The proposed methodology will be based on the following tasks:

Task 1	→	Task 2	→	Task 3	→	Task 4
• Pre-environmental compliance supervision tasks		• Environmental compliance supervision		• Reporting		• Submission to Client

The methodology is based on the Implementing Agent's procedures, as well as on established procedural requirements of the ISO 14000 standards for Environmental Management Systems, and the supervising and auditing of these systems.

This supervision will be undertaken on a permanent/ongoing basis. The team will be based on site permanently for the duration of the construction period and will ensure that the entire site is managed. The Environmental Supervision Team will undertake the following activities:

- Review of the ESMP and associated documentation (e.g. the Contractor's Code of Conduct) with regards to the construction phase, as delegated by the Implementing Agent.
- Compile a checklist that will be used during the construction period to determine whether all the ESMP requirements and EL conditions have been implemented and are maintained for the duration of the project.
- Compile material for environmental inductions for all the Contractor's staff to inform them of the ESMP and EL requirements and basic legal requirements.
- Supervise and inspect all work done by the Contractor against environmental and social specifications.
- Ensure that the Contractor adheres to the environmental and social requirements, standards and legislation.
- Identify possible shortcomings in the environmental specifications and propose corrective action.
- Monitor the implementation of environmental mitigation measures and their effectiveness.
- Monitor the bush clearance team's compliance with applicable legislation, the Implementing Agent's standards and procedures, and this ESMP's requirements.
- Monitor the compliance of rehabilitation/reinstatement measures with applicable legislation, Implementing Agent standards and procedures, and this ESMP's requirements.
- Verify all physical work done by the Contractor as per contract and environmental specifications.
- Determine and identify environmental non-compliance.
- Keep photographic record of progress on the site.
- Review the Contractor's Method Statements, as required by this ESMP, from an environmental perspective, prior to the proposed activities taking place.
- Ensure that the requisite remedial action, following an environmental incident, event or finding of non-compliance, is implemented in the event of non-compliance, and capture proof in the subsequent inspection audit.
- Address and ensure that an ethos of progressive rehabilitation takes place throughout the construction phase so as to ensure that the development site is rehabilitated to a high level of environmental integrity that is not only aesthetically pleasing but also ecologically functional.
- Review the Contractor's register of public complaints and confirm that all public comments or issues have been appropriately reported and addressed, and verify that corrective action has been undertaken.

- Review and update the ESMP, based on recommendations of the Implementing Agent's Environmental Manager, where necessary.
- Participate in final inspections, take-overs and handovers to ensure that environmental requirements have been met and implemented.

The Environmental Team will report any environmental non-conformances in a purpose-designed Incident Report that allows for identification of the root causes of the incident, as well as tracking of the corrective action and close-out of the incident. It will be ensured that any incident reported to the Implementing Agent is correlated and, where possible, that ways are identified to prevent it from re-occurring. All non-compliances with the ESMP/EL will be reported, in line with pre-determined procedures.

The Environmental Team will ensure that all site registers and logbooks used to record environmental incidents and information are updated, and available at all times. Furthermore, the ECOs will inspect measures that have been taken to address incidents to confirm whether these measures have been implemented as planned, and whether the corrective action is successful so as to allow the incident report to be closed.

The Environmental Team will compile a monthly Environmental Supervision Report which will be provided to the Implementing Agent for review and consideration. For the purpose of this document, the collective role of this team is referred to as the Owner's Engineer's ECO.

4.5.2 Community Management

A community management team is required in order to ensure a sensitive approach to social impacts and to foster open communication between the construction team and the local inhabitants so that potential problems can be identified and addressed as they arise.

The supervision work will be carried out by a principal Community Manager (CM)/Social Specialist that will report to the Project Manager. The Community Manager will be supported by a team of local community and social facilitators[1]. The community and social facilitators will be allocated to each section of work, according to the needs of the project and the construction schedule. The team will be based on site permanently for the duration of the construction period and will ensure that the entire site is managed. The community facilitators will be employed from the local community as they are familiar with local customs and languages. They will be provided with training at the start of their engagement to enable them to understand the project, ensure that they convey appropriate messages to affected parties and to assist them with obtaining the necessary information from the affected parties regarding project-related issues in a culturally-appropriate manner.

The purpose of the Community Supervision Team will be as follows:

- To ensure that construction takes place in a socially-just manner.
- To manage the relationship between the local authorities and population, with the client, Contractor and sub-contractors.
- To address grievances lodged by the local population, including GBV-specific grievances.
- To ensure that project-affected communities are informed about the relevant aspects of the project.
- To keep the project-affected communities updated on the progress of construction activities.
- To ensure that the Social Management Plan, Stakeholder Engagement Plan, Vulnerable Groups Plan, Resettlement Action Plan and Community Awareness Training are satisfactorily implemented.

This will be achieved by conducting the following activities:

- Training local facilitators to ensure an adequate understanding of their roles and responsibilities, and how these should be carried out.

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[1] For continuity, these local facilitators should be employed across multiple project phases. For example, they could be employed to assist with the RAP during pre-construction and remain for the construction and operational phases.

- Developing procedures and protocols to be implemented by the local social facilitators, the Contractor and sub-contractors when performing their duties in the social environment, including procedures for adequate and accurate recordkeeping of activities.
- Developing and implementing a feasible grievance procedure (in agreement with the Implementing Agent) in order to address grievances lodged by the project-affected communities. Establish a process within the Grievance Mechanism specifically for the handling of gender-based violence (GBV) incidents/complaints that provides protection and support for the victim, so that no identifiable information on the victim is stored in the Grievance Mechanism (GM) and refer the victim to service providers for support.
- Monitoring the implementation of the Social Management Plans and Community Awareness Training.
- Identifying shortcomings or inappropriate actions taken as part of construction and propose corrective measures or alternative actions.
- Communicating with the Contractor and sub-contractors in order to stay abreast of the construction progress and problems experienced by construction teams.
- Establishing, maintaining and managing a channel of communication with the project-affected communities and local authorities.

The entire Community Management Team will provide environmental advice, in conjunction with the Implementing Agent, to the Contractor and affected parties, as and when required.

The Community Manager will compile a monthly Community Supervision Report which will be provided to the Implementing Agent for review and consideration.

The Community Management Team will report any non-conformances on a purpose-designed Incident Report that allows for identification of the root causes of the incident, as well as tracking of the corrective action and close-out of the incident. It will be ensured that any incident reported to the Implementing Agent is correlated and, where possible, ways are identified to prevent it from re-occurring. However, it must be emphasized that the onus for identifying corrective actions will be on the EPC Contractor. All non-compliances with the ESMP/ECC will be reported in line with pre-determined procedures.

The Community Management Team will ensure that all site registers and logbooks recording environmental incidents and information are updated, and available at all times.

4.5.3 Quality, Health and Safety Management

The Quality, Health and Safety Management function will include the following tasks:

- Carry out construction supervision.
- Conduct internal site audits and report to the Implementing Agent on a regular basis.
- Adapt the ISO 9001 system to the specific needs of the site, and a full organisational structure that includes the Project Management Team Staff, Contractor's representatives and the Implementing Agent's representatives, will be drawn up and included in the contract quality assurance plan.
- Ensure that site inductions are done and are valid.
- Report all health and safety issues and incidents that occur on site.
- Carry out a final inspection of the works together with representatives from the Client and the EPC Contractor.

4.6 EPC Contractor

The term 'Contractor' in the context of the ESMP refers to the appointed Lead Engineering, Procurement and Construction (EPC) Contractor responsible for any site activities, or portion of the site activities required for the construction phase of the project. The Contractor shall be responsible for ensuring the day-to-day implementation of the ESMP during the construction activities and, therefore, must be well-versed in the requirements of this document. The Contractor shall conduct activities in a manner that will cause the least possible disturbance to the existing amenities, whether natural or man-made, in accordance with all applicable legal requirements. Disturbance or disruption of the daily lives of local communities shall be avoided, wherever possible.

The role of the Contractor (pertaining to environmental matters) will include:

- Liaison with the Owner's Engineer and Independent ECO as required.
- Assuming the responsibility for the administration and implementation of sections of the ESMP relevant to the Contract, to ensure adherence to the local legal requirements and relevant international standards.
- Nominating a suitable member of staff to fulfil the role of Environmental Officer (EO) and providing the details of this person to the Owner's Engineer for approval (see Section 4.6.1 below).
- Ensuring all work areas and site activities pertaining to the Contract are conducted in an environmentally-sensitive manner, and in accordance with the relevant sections of this ESMP.
- Providing environmental and social awareness training, staff induction training and emergency response procedures to all relevant staff, ensuring that awareness is built with regards to environmental and social management and that they are adequately informed of the requirements of the ESMP pertaining to their role on site.
- Developing a Code of Conduct, to be signed by all employees (and sub-contractors), which must ensure compliance with the management plans in Section 5, which includes behaviours, and associated consequences, relating to, *inter alia*:
  - Protection of natural resources;
  - Resource efficiency;
  - Interactions with local communities including gender-based violence (GBV);
  - Behavioural issues and criminal activities; and
  - Health and safety, etc.
- The Contractor is also responsible for all sub-contractors, suppliers and service providers and must ensure that all persons on site (temporary or permanent) have undergone induction training and are conversant with the ESMP, or relevant sections of the ESMP pertaining to their role on site. The Contractor must task the EO to monitor the activities of sub-contractors and service providers to ensure that they comply with the ESMP requirements.

- Compilation and submission of workplans or method statements required in terms of this ESMP (either specified, or for any activities that are proposed as variations to the standard construction practices detailed or referred to in the Contract Documents, or for any activities requiring special attention as specified in this ESMP and/or requested by the Owner's Engineer, or Competent Authority). Method statements should include, at the least, the following:
  - No-go areas
  - Bush clearing
  - Soil protection
  - Stockpiling (if outside the camp) and rehabilitation of stockpiled areas
  - Site establishment, location and contractor camps
  - Workshop and equipment storage areas
  - Hazardous substances management (including fuel)
  - Herbicide use (see Section 11.2)
  - Ablution facilities
  - Watercourse crossings
  - Water use and abstraction
  - Discharge of water to the environment
  - Concrete batching
  - Waste management
  - Closure and reinstatement or rehabilitation

- Liaise closely with the Owner's Engineer's ECO on any environmental management issues, environmental incidents or events, or emergencies affecting the environment.
- Provide regular feedback to the Owner's Engineer's ECO regarding the project and notify if there are any issues.
- Addressing the findings of the inspections/audits, reacting to any instructions issued by the Owner's Engineer with respect to non-compliance with the ESMP, dealing with emergency or unforeseen situations and reacting to complaints/issues raised by the public.
- Providing and managing an Environmental Incident Report File which documents time, date, location and nature of any incidents; corrective actions taken and by whom, as well as date; comments on the cause of the incident; and signature. The Owner's Engineer ECO must be kept informed.
- Providing managing a Complaints Register which includes time and date of the complaint, name and contact details of the complainant, location and nature of the complaint, corrective actions undertaken and by whom as well as the date, and signature. Following the complaint, an investigation must take place and a response by the EO to the complainant must be provided within seven working days. The Owner's Engineer ECO should be kept informed.

4.6.1 Environmental Officer (EO)

The term 'EO' in the context of the ESMP refers to the nominated staff member of the Contractor who will fulfil the role of the Contractor's environmental representative to ensure compliance with the ESMP and relevant environmental legislation. The EO shall ensure that the works on site are conducted in an environmentally-responsible manner that is consistent with the requirements of this ESMP. Therefore, the EO must be fully conversant with all the requirements of the ESMP, conditions of the EL, and relevant permits and licenses. The EO will liaise closely with the Owner's Engineer and their ECO in all matters relating to the implementation of the ESMP.

NOTE: It is possible that the Health and Safety representative of the Contractor can also fulfil this role.

The duties and requirements of the EO must include:

- Liaison with the Contractor and Owner's Engineer's ECO on matters relating to the environmental considerations on site.
- Assisting with the compilation of environmental components of Method Statements on behalf of the Contractor for the approval by the Owner's Engineer.
- Being a dedicated project resource on site throughout the duration of construction phase.
- Undertaking daily inspections of all work areas to ensure all activities and behaviours of persons on the site are being undertaken in accordance with the ESMP.
- Maintaining site documentation and records pertaining to the ESMP and environmental matters and approvals, and submitting/reporting on these as needed.
- Providing a regular and routine account of environmental matters for the Owner's Engineer, including any environmental incidents, events or accidents, and reporting on any entries in the Environmental Incident Report File or Complaints Register. This account may take the form of a written report or checklist or similar, or meeting with the Owner's Engineer and their ECO.
- Overseeing the implementation of corrective action for non-conformances within the stipulated timeframes.
- Responding to, and reporting on, environmental accidents, incidents and events within appropriate timeframes, and ensuring that all works requiring remediation are undertaken in accordance with the Owner's Engineer's instructions.

4.6.2 Health and Safety Officer

The Contractor must appoint a 'Health and Safety Officer'. Their duties include, *inter alia*:

- Implementation of health and safety policies, procedures and management plans, notably the Occupational Health and Safety Plan.
- Review and analysis of monitoring results and preparation of reports to management and stakeholders.
- Ensure compliance with relevant health and safety legislation.
- Planning of, and carrying out, safety training programs for employees and contractors.
- Obtaining and maintaining all necessary safety permits.
- Management of the safety-related components of the grievance mechanism.
- Inspections/audits of safety requirements for all employees and sub-contractors within the designated site.
- Sampling and data capture in accordance with safety monitoring program, and analysis of results.
- Assistance with the preparation of reporting and permit applications.

4.6.3 Community Liaison Officer/s

The Contractor must appoint at least one male and one female 'Community Liaison Officer/s' (CLO/s), who are familiar with the local languages and customs. It is preferable that this role is fulfilled by an Indigenous Person or at least from one of the local rural communities. It is also possible that the Environmental Officer could fulfil this role. Their duties include, *inter alia*:

- Communicate information regarding construction activities and scheduling to project affected communities.
- Address any required day-to-day interactions between the construction staff and communities, with prior co-ordination with the Owner's Engineer's Community Management Team.
- Attend all co-ordination meetings requested by Owner's Engineer's Community Management Team on a regular and ad hoc basis, as required.
- Report to Owner's Engineer's Community Management Team on a regular and ad hoc basis – with regards to social incidents and community relations issues.
- Involvement in, and assisting with, the implementation of the Resettlement Action Plan, Stakeholder Engagement Plan, Vulnerable Groups Plan, Social Management Plan and Community Awareness Training, where required.
- Serve as a channel for reporting grievances to the Owner's Engineer's Community Management Team.

4.7 Independent ECO

The Implementing Agent must appoint a suitably qualified 'Independent Environmental Control Officer' Their duties during construction include:

- Responsible for auditing all activities and behaviours on a site to verify if the work undertaken by the EPC Contractor complies with the requirements of the conditions stipulated in the EL, as well as the requirements outlined in this ESMP. This includes the following:
  - Undertaking compliance inspections and audits at defined intervals, as per the ECO Schedule, as well as the requirements of the conditions of the EL and any other relevant environmental permits and licenses.
  - Preparing reports on the findings of the inspections and audits, and on any emergency or unforeseen situations in which the expertise of the ECO has been consulted.
  - Making reports available to the Contract Manager, the Contractor and the Environmental Authority according to the ECO Schedule.

- Visiting the site on a regular basis to assess the project, its aspects and impacts, and to advise as to the required actions in order to ensure that all legal requirements, best practice protocols, adherence to by-laws, etc. are observed, and to participate in project management site meetings.

During the operational phase, the Independent ECO is responsible for the following:

- Monitoring of the environmental performance of the project to ensure that the Implementation Agent and any sub-contractors (for example in relation to specialised activities such as pesticide application and alien plant clearing, etc.) comply with the requirements of the conditions as stipulated in any environmental authorisation (EL), as well as with the requirements as outlined in this ESMP.
- Inspection of the project site and surrounding areas at identified intervals, and provision of recommendations for any issues that may have an impact on the environment.
- Ensuring that the requisite remedial action, following an environmental incident, event or finding of non-compliance, is implemented in the event of non-compliance, and then capturing proof thereof in the subsequent inspection audit.
- Liaison with the Implementing Agent's Environmental Manager, Community Liaison Officer/s and the relevant authority, as required.
- Reviewing any environmental-related grievances and confirming that all public comments or issues have been appropriately reported and addressed, including that proof of such action has been retained.

5 Environmental and social management

5.1 Approach to the ESMP

The approach to environmental and social management of the project is based on the Plan-Do-Check-Act cycle, which aims to ensure continual improvement (Figure 5.1).

Figure 5.1: Approach to environmental and social management

This is also known as the 'Deming Cycle Rationale'[1], and relevant definitions are as follows:

Plan: During the **planning** phase, the ESIA Report and ESMP establish the following:

- **Environmental and social management requirement**s are identified, based on the identified impacts, proposed mitigation, and the lender's and legal requirements. The application of mitigation has been based on the mitigation hierarchy (Section 5.2).
- For each environmental or social impact, an **objective** is specified. The aim of the objective is to translate the requirement into a statement of achievement so that if the objective is met, then the requirement will have been met (note that several different requirements could be satisfied by a single objective and vice versa); and
- For each objective specified, an **indicator** is defined that will provide an indication of whether the objective is being met or not. To provide a metric for the indicator, targets are set, which serve to reflect the performance aspirations of each objective. Some indicators are qualitative where no metric is available.

  The Management Plans, showing impacts, objectives and the specifications and mitigation measures, are set out in Section 5.3 of this ESMP. It includes responsibilities and estimated costs of implementation – where above the normal scope of the Contractor, or the standard operating procedures of the utilities or sponsors (Section 9). Section 5.3 also presents the measures proposed to prevent, mitigate, compensate or enhance the impacts identified for the pre-construction, construction and operational phases of the ANNA project.

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[1] Gorenflo, G and Moran J.W. Undated. The ABCs of PDCA. http://www.naccho.org/uploads/downloadable-resources/ABCs-of-PDCA.pdf. Accessed on 2 October 2017.

- The monitoring plan, including the indicators and targets, are set out in Section 5.4, which is divided into four parts, related to the group of activities expected to be done: preconstruction, construction and decommissioning phases, operational phase and baseline collection.

Do: During the **implementation** phase, the project is executed in accordance with the ESMP. Responsibilities for this are set out in Section 4, and recommended training is provided in Section 6.

Note that as part of implementation, the ECO must review and adjust this ESMP in consultation with all other parties, in light of the detailed design, planned construction activities and site-specific constraints. Method statements to address the requirements and show the compliance can be addressed at this stage and reviewed by the responsible parties.

Check: Performance is measured through monitoring. Each performance indicator is therefore monitored to ensure environmental and social objectives are being achieved (refer to Section 5.4 for the detailed monitoring plan). Similarly, the ESMP will be monitored and audited to ensure that it is being implemented effectively. Results are reported and audits are required.

Act: Actions are required to continually improve environmental performance by taking into account recommendations of the ECO, the Environmental Manager, or the environmental authorities.

5.2 Mitigation hierarchy

The overarching approach to environmental and social management is to address risks through the application of the mitigation hierarchy whereby one should "*Anticipate and avoid risks and impacts. Where this is not possible, minimise or reduce risks and impacts to acceptable levels. Mitigate risks and impacts which have been minimised or reduced. Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible*" (DBSA, 2018[1]). This aims for no residual impacts and no net loss of environmental resources. Furthermore, in biodiversity terms, 'no net loss' is defined as "*The point at which project - related biodiversity losses are balanced by gains resulting from measures taken to avoid and minimise impacts, to undertake on - site restoration and to offset any significant residual impacts*". Therefore, 'net gains' are measures that result in additional positive outcomes for conservation. This is demonstrated in Figure 5.2 and the approach has been applied in the management plans in Section 5.3:

Figure 5.2: Mitigation hierarchy

[1] DBSA. 2018. Environmental and Social Safeguard Standards, Johannesburg, DBSA.

5.3 Environmental and social management plans

5.3.1 Climate Adaptation and Resilience Assessment and Management Plan

Identified impacts/risks	1. Impact of the project on climate change: increased GHG emissions 2. Impact of climate change on the project: effects of increased temperatures on personnel; effects of increased temperatures and high rainfall intensity on infrastructure
Objectives of improved management	1. Ensure that all GHG emissions are kept to a minimal, if they cannot be avoided 2. Mitigate effects of climate change on project workers and infrastructure
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS 3: Resource efficiency and pollution prevention ESSS10: Resource efficiency, pollution prevention and management
	EHS Guidelines: General EHS Guidelines – Section 1 Environmental: 1.1 Air emissions and ambient air quality
	Presidential Decree no. 46/14 of 25 February – Approval of the National Action Programme to Fight Desertification (PANCOD) The National Climate Change Strategy (ENAC) 2018-2030 National Adaptation Programme of Action (NAPA)

5.3.1.1 Pre-Construction Measures

Management measure	Detailed Description	Responsibility
Specifications	– RNT shall develop a dedicated GHG management plan. Key elements of this management plan include: • Developing a policy statement indicating the infrastructure commitments with regards to reducing GHG emissions and implementing the required mitigation measures. • Development of annual carbon footprint assessments, which require an appropriate data capturing and management system to support monitoring and evaluation. • The establishment of short, medium and long-term GHG emission targets, which should be in line with national mitigation objectives and will allow performance to be monitored. – Identify maintenance practice and process that help reduce lifetime GHG emissions.	RNT
Avoidance	– Choose technology, equipment and materials and respective sources, as this has the potential to make significant contributions to the reduction of project emissions across the entire lifecycle. This entails:	Project designer Contractor

Management measure	Detailed Description	Responsibility
	• Exploring alternative construction technologies and equipment with lower carbon footprints and reduced risk of fugitive emissions • Alternative construction materials with lower embodied emissions • Fuel-efficient construction equipment and vehicles • Making use of locally-sourced materials reducing the need to transport materials over long distances. • Eliminate the need for certain materials or make use of recycled materials. • Adequate planning and efficient use of materials can also help further reduce the project's carbon footprint. – Section 6.2.1 of the ESIA Report (Volume II) provides a summary of the most significant contributors to GHG emissions during construction, which can be referenced to ensure that areas of high impact are being prioritised for intervention.	
Mitigation/ Reduction	– Improve flood protection for ground level equipment and infrastructure, mainly substations and pylons located in areas at risk of flooding.	
Stop work	N/A	

5.3.1.2 Construction and Decommissioning Measures

Management measure	Detailed Description	Responsibility
Specifications	N/A	Contractor
Avoidance	– Establish a heat stress prevention program that includes: • The provision of adequate water for staff. • Training on heat stress. • Inclusion of frequent breaks in construction schedules. • Ensure protective clothing is provided and worn. • Minimisation of work undertaken in midday heat, rather in cooler morning or late afternoon hours.	
Mitigation/ Reduction	– Waste Minimisation and Management measures, based on the efficient use of new materials and minimisation of waste sent to landfill, through application of the following steps: • Reducing complexity within the design. • Careful specification of materials to avoid wastage. • Avoid changes to the design resulting in wastage by setting clear objectives and requirements from the outset. • Avoid damage to materials during transport, storage and fitting. • Effective communication between design team, procurement and contractors. • Use materials with recycled content where possible. – Management of land use change emissions, such as (also included in Section 5.3.6):	

Management measure	Detailed Description	Responsibility
	• Actively minimise land clearing during construction. • Rehabilitate land and vegetation temporarily disturbed during construction. – Consider the use of alternative fuels: biodiesel can be considered for mobile combustion such as onsite power generation and transport of materials and workers.	
Stop work	N/A	

5.3.1.3 Operational Measures

Management measure	Detailed Description	Responsibility
Specifications	N/A	RNT
Avoidance	– Establish a heat stress prevention program that includes: • The provision of adequate water for staff. • Training on heat stress. • Inclusion of frequent breaks in maintenance schedules. – Ensure protective clothing is provided and worn.	
Mitigation/ Reduction	– Should the infrastructure be affected by the increase of temperature (unlikely), implement demand management to help to effectively address the efficiency reduction. – Undertake regular forecasting to prepare in advance for extreme weather events that might affect the infrastructure. – Set up rapid emergency repair teams to repair damaged infrastructure quickly, to limit impact on operations and ensure continuity.	
Stop work	N/A	

5.3.2 Integrated Water Resource Management Plan

Identified impacts/risks	1. Potential disturbance of, or interference with, watercourses 2. Potential water resource (superficial and subterranean) contamination 3. Potential localised dewatering of the aquifer 4. Potential sedimentation of watercourses due to erosion
Objectives of improved management	1. Ensure that any disturbance or interference to the natural drainage lines are kept to a minimum, if they cannot be avoided 2. Prevent and remediate the occurrence of any accidental spills, water or soil contamination in order to ensure that water resource (superficial and subterranean) quality and use is not compromised 3. Ensure that, if any groundwater abstraction is needed, it is done within admissible aquifer capacity and natural recharge volume range 4. Prevent the sedimentation of any natural drainage line, due to sediment mobilisation and transport associated to construction activities and soil erosion
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS 3: Resource efficiency and pollution prevention ESSS10: Resource efficiency, pollution prevention and management
	EHS Guidelines: General EHS Guidelines – Section 1 Environmental: 1.3 Wastewater and ambient water quality; 1.4 Water conservation EHS Guidelines: General EHS Guidelines – Section 3 Community Health and Safety: 3.1 Water quality and availability EHS Guidelines: General EHS Guidelines – Section 4 Construction and Decommissioning: 4.1– Environment; Wastewater discharges EHS Guidelines: EHS Guidelines for Electric Power Transmission and Distribution – Section 1.0 Industry Specific Impacts and Management: 1.1– Environmental: Aquatic habitat alteration
	Law no. 6/02 of 21 June - Water Law Presidential Decree no. 261/11 of 6 October - Regulation on Water Quality Presidential Decree no. 141/12 of 21 June - Regulation for the Prevention and Control of Pollution in National Waters Presidential Decree no. 82/14 of 21 April - Regulation of General Use of Water Resources Presidential Decree no. 126/17 of 13 June - National Water Plan

5.3.2.1 Pre-construction

Management measure	Detailed Description	Responsibility
Specifications	– The Contractor shall review and adjust this Integrated Water Resource Management Plan considering the planned construction activities and site-specific constraints. Special attention should be taken into the presence of perennial watercourses such as Caculuvar and Cunene rivers and, in the wet season or after storms other drainage lines daring water at the time of the construction (refer to Figure 11.1) – Obtain the necessary approvals for abstracting water from the any local river, or utilising municipal supply, where necessary for the construction activities. – Obtain any necessary approvals for drilling borehole from the Energy and Water Ministry (MINEA[1]), in consultation with the Traditional Authorities, should it be required to source groundwater for the construction activities or to implement or repair any borehole for the community as part of the livelihood restoration plan. – If boreholes are required for the reasons above, the applicable geohydrological studies should be undertaken to inform the location and sustainability of groundwater sources.	Contractor
Avoidance	– The final location of the pylons must avoid disturbing any natural watercourse (perennial or ephemeral) or any aquatic sensitive area identified by the ecologist during his walkthrough. – The designing of the construction access routes should contemplate the use of the existing roads and accesses, as much as possible. – The design of the access road must include drainage and control of runoff flow, to ensure erosion control.	
Mitigation/ Reduction	N/A	
Stop work	N/A	

5.3.2.2 Construction and Decommissioning Measures

5.3.2.2.1 Disturbance or interference with watercourses

Management measure	Detailed Description	Responsibility
Specifications	– If the disturbance of, or interference with, the natural drainage lines cannot be avoided, it must be kept to a minimum and rehabilitated as soon as possible.	Contractor
Avoidance	– Natural stormwater runoff not contaminated during the development, and clean water, can be discharged directly into the local drainage lines, subject to the Implementing Agent's Project Manager's approval and supported by the ECO. There must be no impact on the long-term morphological dynamics of local drainage lines and watercourses. – When working near a watercourse, the following must be taken into consideration: • The water levels during the period of construction must be respected	

[1] Ministério da Energia e Águas

Management measure	Detailed Description	Responsibility
	• No alteration may be made to the bed, banks, course or characteristics of the watercourse. – Where earthworks are being undertaken in close proximity to a watercourse, slopes must be stabilised using suitable materials, e.g. sandbags or geotextile fabric, to prevent sand and rock from entering the channel. – Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, banks should be appropriately and incrementally stabilised as soon as development allows.	
Mitigation/ Reduction	– Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in sedimentation ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and supported by the ECO, and pertaining to legislation regarding the quality of disposal water.	
Stop work	– Unauthorised/unpredicted interruption of the normal flow of the watercourse, or release of suspended solid contaminated water into the natural drainage lines	

5.3.2.2.2 Water resource (superficial and subterranean) contamination

Management measure	Detailed Description	Responsibility
Specifications	– Prevent and remediate the occurrence of any accidental spills, water or soil contamination.	Contractor
Avoidance	– Ensure that substances that pose a risk of water/soil contamination are appropriately stored and disposed of (also refer to Section 5.3.3). – Sewage must be collected and removed from the site for appropriate disposal at a duly licenced facility. – The quality and quantity of effluent streams discharged to the environment, including stormwater, must be managed and treated to meet the applicable effluent discharge guidelines (refer to Section 5.4.1). Cement / concrete batching: – All measures set out in Section 5.3.13.2, referring to the construction waste management plan, must be put into practice. Runoff from the cement/concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the ECO. Hazardous substances and chemicals: – All measures set out in Section 5.3.8 and in Section 5.3.13, referring to the Hazardous material and Waste Management Plans, must be put into practice. With particular relevance for water resources management, are the measures that control and prevent the accidental contamination of soils and watercourses. Ablutions – Ablution facilities must be located at least 100 m away from any watercourse. – Ablutions shall be placed on level surfaces and secured to the ground if onsite areas are susceptible to potential flooding. – The Contractor shall be responsible for the cleaning, maintenance and servicing of all toilets and ablutions. No spillage may occur when toilets are emptied. – Toilets shall have an external closing mechanism to prevent paper blowing out when not in use, and no litter or general waste shall be placed in these toilets.	

Management measure	Detailed Description	Responsibility
	– Workers should not be allowed to urinate or defecate anywhere but in the toilets provided. – Mobile chemical toilets are to be installed onsite, if no other ablution facilities are available, and must be protected from vandals.	
Mitigation/ Reduction	– All measures set out in Section 5.3.13.2, must be put into practice. – Ensure oily wastewater from wash bays undergo treatment in an oil separator before being discharged to a lined detention pond and eventually discharged to the environment. – Ensure that emergency spill kits are present at strategic locations with trained people available to use it in the case of accidental spillages. – The Contractor must report all major incidents to the ECO immediately. Any spill incidents must be cleaned up immediately and in accordance with the emergency procedure. – Use designated washing areas for all equipment used for concrete work, with the necessary mechanisms in place to retain contaminated runoff and allow for the necessary treatment/filtering of polluted water. Tools wash water and drum wash are to be disposed of in a settling pond before discharge. – Concrete spills will be allowed to harden and be removed within 2 days for re-use as fill, or for disposal at an appropriate site designated by the ECO.	
Stop work	– Unauthorised/unpredicted interruption of the normal flow of a watercourse, or release of contaminated water into the natural drainage lines. – Mismanagement of waste concrete and/or cement-laden runoff can result in the suspension of bulk concrete batching activities via instruction from the ECO, until non-conformances have been rectified to the ECO's satisfaction. – Should a major spill occur, the ECO may request the Engineer to suspend, or partially suspend, construction in order to allow for the assessment, reporting and rectification of the impact. – Depending on the severity of the non-conformance, and the degree of negligence on the Contractor's part, the ECO must also inform the relevant authorities to confirm the Contractor's liability to be prosecuted and/or fined.	

5.3.2.2.3 Localised dewatering of the aquifer

Management measure	Detailed Description	Responsibility
Specifications	– If any groundwater abstraction is needed, it may only be done within admissible aquifer capacity and natural recharge volume range.	Contractor
Avoidance	– Monitor abstracted volumes. – Monitor water levels of construction borehole/s, as well as other nearby boreholes, as set out in Section 5.4.1.	
Mitigation/ Reduce	– Ensure water conservation is being practiced by: • Including water use and conservation in the environmental awareness training. • Reusing, recycling or treating water where possible (use of grey water should be encouraged, for example water can be reused for dust suppression). • Minimising water use for cleaning of equipment.	

Management measure	Detailed Description	Responsibility
	• Undertaking regular audits of water systems.	
Stop work	– Stop pumping immediately if dewatering is detected, and revise pumping rates and equipment to obtain sustainable abstraction rates.	

5.3.2.2.4 Sedimentation of watercourses due to erosion

Management measure	Detailed Description	Responsibility
Specifications	– Prevent the sedimentation of any natural drainage line or watercourse.	Contractor
Avoidance	– Vegetation and topsoil clearance can only occur in increments and done up to two weeks ahead of actual construction (i.e. excavation) commencing in an area. – The stockpiles (construction materials, topsoil, subsoil, imported materials such as sand and fill material etc.) cannot be located in, or near, natural drainage areas, and must be located on flat surfaces, away from areas susceptible to concentrated stormwater runoff or flow. – All construction camps and stockpiles or storage areas are to be located outside of any watercourse. – Stormwater runoff must be diverted around the construction site camp and stockpile areas by means of cut-off berms or trenches to avoid contamination of clean overland runoff.	
Mitigation/ Reduction	– Implement specific stormwater management and erosion prevention measures in all areas with high erosion potential (e.g. river banks, steep slopes). – Clean stormwater, generated on the construction footprint, can be discharged into the surrounding drainage lines and vegetation and cannot be allowed to collect and concentrate in large volumes, or discharge at high velocities. – Water contaminated with suspended solids may be released only once all suspended solids have been removed in sedimentation ponds. The release of settled water into the environment must be subject to the Project Manager's approval and supported by the ECO, and as per relevant legislation regarding disposal water quality. – All disturbed areas must be rehabilitated as soon as possible after construction has been completed in order to stabilise exposed surfaces susceptible to erosion.	
Stop work	– Unauthorised/unpredicted interruption of the normal flow of the watercourse, or release of water highly contaminated with suspended solids into the natural drainage lines	

5.3.2.3 Operational Measures

5.3.2.3.1 Disturbance or interference with watercourses

Management measure	Detailed Description	Responsibility
Specifications	– The disturbance of the natural drainage lines is kept to a minimal and rehabilitated as soon as possible.	RNT

Management measure	Detailed Description	Responsibility
Avoidance	– All access roads shall be monitored for the development of erosion features during maintenance inspections of the transmission line. – Complete an incident report after inspection/maintenance activities of the location of disturbed or eroded drainage areas. This should initiate an immediate response to control the occurrence before it degrades even further.	
Mitigation/ Reduction	– Make sure that the access roads along the powerline are stabilised with packed stones when crossing watercourses or, if this measure is considered insufficient, implement concrete tracks in the areas susceptible to excessive erosion/scour. – Implement road berms ("speed bumps") at regular intervals across the access road to divert surface water runoff away from the road and into the adjacent natural area. – Maintain the integrity of the banks of watercourses by only trimming parts of trees directly affecting the safe operation of the line.	
Stop work	N/A	

5.3.3 Soil and Erosion Management Plan

Identified impacts/risks	1. Potential loss of topsoil 2. Soil erosion 3. Accidental soil contamination
Objectives of improved management	1. Ensure that topsoil is properly removed and managed during construction in order to enable successful rehabilitation on completion of construction. 2. Reduce soil exposure to stormwater and wind to prevent soil degradation and potential loss of its capacity to ensure the settling, subsistence and survival of vegetation. 3. Prevent and remediate the occurrence of any accidental spills or soil contamination in order to maintain its capacity and integrity.
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS 3: Resource efficiency and pollution prevention ESSS10: Resource efficiency, pollution prevention and management
	PS6: Biodiversity conservation and sustainable management of living natural resources ESSS9: Biodiversity conservation and sustainable management of living natural resources and resilience
	EHS Guidelines: General EHS Guidelines – Section 1 Environmental: 1.8 Contaminated land EHS Guidelines: General EHS Guidelines – Section 4 Construction and Decommissioning: 4.1– Environment; Soil erosion and Contaminated land

5.3.3.1 Pre-Construction Measures

Management measure	Detailed Description	Responsibility
Specifications	– The Contractor shall review and adjust this Soil and Erosion Management Plan after considering the planned construction activities and site-specific constraints.	Contractor
Avoidance	– The design of the construction access route should make use of the existing roads and accesses as far as possible. – Access routes must include drainage and control of runoff flow, to ensure erosion control.	
Mitigation/ Reduction	N/A	
Stop work	N/A	

5.3.3.2 Construction and Decommissioning Measures

5.3.3.2.1 Potential loss of topsoil and soil erosion

Management measure	Detailed Description	Responsibility
Specifications	– Topsoil is properly removed and managed during construction to enable successful rehabilitation on completion of construction.	Contractor
Avoidance	– Topsoil must be removed from construction areas to a maximum depth of 30 cm, depending on the depth of the soil horizons. Where the topsoil layer is shallow, or alternating in depth, it must be removed to the maximum depth possible. Cleared vegetative materials should be considered as forming part of the topsoil. – Store topsoil in protected stockpiles (maximum height 2 m), in specifically-designated areas, protected from compaction and contamination due to other construction activities, for later use in the rehabilitation operation. If the topsoil stockpiles must remain on site for periods longer than 1.5 years, they should be seeded with a mixture of local herbaceous vegetation (preferably a mix with cereals and legumes) to ensure the maintenance of soil quality and to avoid infestation of invasive species. – Avoid moving/handling the topsoil more than twice (i.e. restricted to initial stripping and final re-application). Do not move topsoil between different areas on site, i.e. it should be re-applied in the same area that it was removed from. – Construction activities must be phased to minimise the area of disturbance at one time. Areas having to be stripped of topsoil for construction purposes must be kept to a minimum and only stripped when work is about to take place. Vegetation and topsoil clearance can only occur at increments and done no more than two weeks ahead of actual construction (i.e. excavation) commencing in an area. – Existing vegetation must be preserved as far as possible and vegetation clearing at pylon sites must be kept to a minimum. Large trees with large root systems shall be felled manually and removed, as the use of a bulldozer will cause major damage to the soil when the root systems are detached.	
Mitigation/ Reduction	– Limit the height and slope of material stockpiles to reduce wind entrainment. Stockpiles exceeding 2 m in height are more likely to cause dust during windy conditions.	

Management measure	Detailed Description	Responsibility
	– All stockpiles must be stored in a demarcated area protected from wind and rain erosion (either through covering and/or orientation and/or barriers) and in a location where watercourses cannot be impacted on. – Ensure that all weeds and alien invasive species are removed from the stockpiles prior to reaching seed formation stage. – Disturbed areas no longer used for construction purposes must be stabilised and revegetated immediately. – Apply mulch to the topsoil if its quality has been impacted significantly (e.g. compaction or storage from a period longer than 1.5 years) and can compromise the success of revegetation (based on the considered opinion of the ECO). – Implement all mitigation measures referring to the protection of water resources (Section 5.3.2).	
Stop work	– Interruption of the normal flow of the watercourse, or release of water with a high concentration of suspended solids into the natural drainage lines (refer to Section 5.3.2.2).	

5.3.3.2.2 Accidental soil contamination

Management measure	Detailed Description	Responsibility
Specifications	– Prevent and remediate the occurrence of any accidental spills or soil contamination.	Contractor
Avoidance	– Ensure that all equipment, machinery and vehicles are in good working order, and that there are no leakages. No maintenance will take place on site, and broken equipment, machinery and vehicles must be removed off-site within 24 hours of the breakdown. Where possible and practical, all maintenance of vehicles and equipment should take place of-site and only in the workshop area, if unavoidable. – Ensure that all substances that pose a risk of water/soil contamination are appropriately stored, handled and disposed of (also refer to Section 5.3.8). – Implement all mitigation measures referring to the protection of water resources (Section 5.3.2).	
Mitigation/ Reduction	– All accidental spills must be immediately contained and adequately cleaned-up, or treated *in situ,* as set out in Section 5.3.13.	
Stop work	– If there is any release of contaminated water into the soil. – Should a major spill occur, the ECO reserves the right to suspend, or partially suspend, construction via instruction from the Implementing Agent in order to allow for the assessment, reporting and rectification of the impact. – Depending on the severity of the non-conformance and the degree of negligence on the Contractor's part, the ECO will also inform the relevant competent authority to confirm the Contractor's liability to be prosecuted and/or fined.	

5.3.3.3 Operational Measures

5.3.3.3.1 *Potential loss of topsoil and soil erosion*

Management measure	Detailed Description	Responsibility
Specifications	– During maintenance activities, keep to existing roads within the servitude and do not deviate from them.	RNT
Avoidance	– Complete an incident report after inspection/maintenance activities along the transmission line, which includes the location of any eroded areas. This should innitiate an immediate response to control erosion before it worsens. – Refer to Section 5.3.6.3 for specific vegetation-clearing mitigation measures. – Implement all mitigation measures referring to the protection of water resources (Section 5.3.2).	
Mitigation/ Reduction	– Implement all mitigation measures referring to the protection of water resources (Section 5.3.2).	
Stop work	N/A	

5.3.3.3.2 *Accidental soil contamination*

Management measure	Detailed Description	Responsibility
Specifications	– Prevent and remediate the occurrence of any accidental spills or soil contamination.	RNT
Avoidance	– Ensure that all equipment and vehicles are in good working order. – Ensure that substances that pose a risk of water/soil contamination are appropriately stored, handled and disposed of (also refer to Section 5.3.8). – Implement all mitigation measures referring to the protection of water resources (Section 5.3.2).	
Mitigation/ Reduction	– All accidental spills must be immediately contained and adequately cleaned-up, or treated *in situ,* as set out in Section 5.3.13.	
Stop work	N/A	

5.3.4 Air Quality Management Plan

Identified impacts/risks:	1. Dust emissions due to earthworks, movement of materials and circulation of vehicles and heavy machinery. 2. Emissions of exhaust gasses and other pernicious substances from the vehicles and machinery. 3. Production of ozone and NOx due to the Corona effect *(this impact was considered negligible in terms of the EHS Guidelines and no additional mitigation measures were thus provided).*

Objectives of improved management	1. Ensure that dust emissions are minimised to a level that does not lead to any significant affectation or disruption of the natural resources or of the quality of life of the local communities. 2. Ensure that the emissions from the vehicles and machinery are minimised to a level that does not lead to any significant affectation or disruption of the natural resources or of the quality of life of the local communities.
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS 3: Resource efficiency and pollution prevention ESSS10: Resource efficiency, pollution prevention and management
	EHS Guidelines: General EHS Guidelines – Section 1 Environmental: 1.1 Air emissions and ambient air quality EHS Guidelines: General EHS Guidelines – Section 2 Occupational health and safety: 2.4 - Chemical hazards: Air quality EHS Guidelines; General EHS Guidelines – Section 4 Construction and Decommissioning: 4.1– Environment: Air quality EHS Guidelines; EHS Guidelines for Electric Power Transmission and Distribution – Section 1.0 Industry Specific Impacts and Management: 1.3– Community health and safety: Noise and Ozone

5.3.4.1 Construction and Decommissioning Measures

5.3.4.1.1 Dust emissions due to earthworks, movement of materials and circulation of vehicles and heavy machinery

Management measure	Detailed Description	Responsibility
Specifications	– Dust emissions must be minimised.	Contractor
Avoidance	– Limit the amount of disturbed area at any one time as far as possible. Dust suppression is only required near sensitive receptors and/or if complaints are received. Measures can include water or non-toxic chemical dust suppression. If water is used, it must be reused/recycled water (i.e. from settlement ponds). Any chemicals utilised must be of a biodegradable nature and approved by the ECO. – Site activities must be planned so that machinery and dust-generating activities are located away from sensitive receptors (i.e. homesteads or villages), as far as possible. – Establish and enforce vehicle speed limits on haul roads and construction camps to reduce dust emissions. – All access roads must be maintained. – No overloading of fine material must be permitted and, where necessary, truck loads transporting fine material must be covered with a tarpaulin to prevent dust emissions. – Limit the height of stockpiles that could cause a dust nuisance to 1 m. Where this cannot be achieved, cover fine material stockpiles with shade cloth, hessian or a similar acceptable cover. – Limit earthworks during windy conditions (i.e. winds above 40 km/h). – Limit vehicle travelling speeds on unsurfaced roads to 40 km/h. – Revegetate all disturbed areas as early as possible.	

Management measure	Detailed Description	Responsibility
Mitigation/ Reduction	– All dust complaints received from the community will be recorded in a complaints' register (as set out in Section 4.6), promptly investigated and addressed. Communities may report a grievance if they feel that it has not been addressed as set out in Section 8 (Grievance Mechanism). – Should there be a high incidence of complaints, additional measures will need to be developed and implemented to the satisfaction of the ECO.	
Stop work	– Work causing dust emissions must be halted at wind speeds exceeding 40 km/h. – Where dust generation leads to/results in a complaint by the communities, the ECO should consider the suspension of the work or activity on site until the source of dust emission is identified and adequate mitigation measures are implemented.	

5.3.4.1.2 Emissions of exhaust gasses from vehicles and machinery

Management measure	Detailed Description	Responsibility
Specifications	– Emissions of exhaust gasses and other harmful air quality substances are minimised.	Contractor
Avoidance	– Select 'low-emission' construction vehicles and machinery wherever possible. Where possible, use low sulphur-containing diesel. – All vehicles and equipment must be well maintained and serviced according to manufacturer's specifications. All equipment shall include a serviced exhaust system and silencers. – Ensure all new vehicles/equipment delivered to site has undergone inspection. – Enforce strict compliance with speed limits for all construction vehicles. – Minimise idling times by enforcing shut down of vehicles and equipment when not in use and/or reducing the maximum idling time to five minutes for all equipment. – Appropriate PPE must be worn at all times when working in areas exposed to hazardous emissions. Small plant must be located away from the work area and kept out of the trenches where people are working. – Prohibit the indiscriminate burning of materials resulting from clearance of trees, bushes, combustible materials and waste.	
Mitigation/ Reduction	– All complaints received from the community will be recorded in a complaints' register (included in the proposed Grievance mechanism – Section 8), promptly investigated and addressed.	
Stop work	– Where emissions lead to/result in a high rate of complaints by the communities, the ECO should consider the suspension of the work or activity on site until the source of the air quality nuisance is identified and adequate mitigation measures are implemented.	

5.3.5 Noise Management Plan

Identified impacts/risks	1. Noise, vibration and emissions dust due to the movement of vehicles and heavy machinery 2. Noise emissions due to the Corona effect *(this impact was considered negligible in terms of the EHS Guidelines and no additional mitigation measures were thus provided)*
Objectives of improved management	1. Ensure that noise emissions are minimised to a level that does not lead to any significant affect on, or disruption in, natural resources, or in the quality of life of the local communities.
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS 3: Resource efficiency and pollution prevention ESSS10: Resource efficiency, pollution prevention and management
	EHS Guidelines: General EHS Guidelines – Section 1 Environmental: 1.7 Noise EHS Guidelines: General EHS Guidelines – Section 2 Occupational Health and safety: 2.3 - Physical hazards: Noise; Vibration EHS Guidelines: General EHS Guidelines – Section 4 Construction and Decommissioning: 4.1– Environment: Noise and vibration EHS Guidelines: EHS Guidelines for Electric Power Transmission and Distribution – Section 1.0 Industry Specific Impacts and Management: 1.3– Community health and safety: Noise and Ozone

5.3.5.1 Construction and Decommissioning Measures

5.3.5.1.1 Noise, vibration and emissions dust due to the movement of vehicles and heavy machinery

Management measure	Detailed Description	Responsibility
Specifications	– Ensure that noise emissions are minimised to an acceptable level.	Contractor
Avoidance	– Construction camps/yards or other activities should not be established near residences (or other noise-sensitive receptors) where possible. Construction activities may only occur during the daylight hours. – Fit silencers to all equipment, and service as needed. – Site inductions should cover the importance of noise control and available noise reduction measures. – All machinery and equipment must be maintained in good working order and must meet current good practice noise emission levels. This should be achieved by including it as a component of contractual agreements of the construction contractors. – All equipment must be turned off when not in use.	
Mitigation/ Reduction	– Should construction have to continue after hours, all communities affected must be notified at least 48 hours in advance. – Prior to any identified particularly noisy processes, the nearest affected communities must be informed at least 48 hours in advance of the proposed timing of these specific works.	

Management measure	Detailed Description	Responsibility
	– Appoint a CLO as a critical element in the management of the impacts - if provided with adequate warning, affected sensitive receptors are sometimes willing to accept excessive noise for a short period of time. – Where reasonable and feasible, good practice noise mitigation measures should be applied including: • Maximising the offset distance between noisy equipment items and sensitive receptors. • Avoiding noisy equipment working simultaneously and in close proximity, when adjacent to sensitive receptors. • Minimising consecutive works in the same locality. • Orienting equipment away from noise sensitive receptors. • Carrying out loading and unloading away from noise sensitive areas. – Ensure good driving practices by minimising reversing of equipment to prevent nuisance caused by reverse alarms; reducing unnecessary acceleration and braking when approaching and leaving the site; complying with speed limits. – All noise complaints received from the community will be recorded in a complaints' register (included in the proposed Grievance Mechanism – Section 8), promptly investigated and addressed.	
Stop work	– Where noise emissions lead to/result in a high rate of complaints by the communities, the ECO should consider the suspension of the work or activity on site until the source of noise is identified and adequate mitigation measures are implemented.	

5.3.6 Biodiversity Management Plan

Identified impacts/risks	1. Loss, or disturbance, of flora and habitats (terrestrial and aquatic) 2. Loss, or disturbance, of fauna (terrestrial and aquatic) 3. Increased risk of avifaunal mortalities due to collisions and electrocution 4. Impacts on sensitive habitats (*Mitigation measures combined with impact 1)* 5. Loss, or disturbance, of natural capital and associated ecosystem services (*Mitigation measures addressed in terms of impacts 1, 2 and 3).*
Objectives of improved management	1. Ensure that the potential loss and disturbance of flora and habitats is kept to a minimum and that all affected areas are rehabilitated as soon as possible. 2. Ensure that the potential loss and disturbance of fauna is kept to a minimum, all disturbed areas are rehabilitated and cleared of all movement as soon as possible. 3. Ensure that avifaunal mortality risks are kept to a minimum. 4. Ensure that the potential loss and disturbance of natural capital and associated ecosystem services is kept to a minimum, that all affected areas are rehabilitated as soon as possible, and that previous uses of local natural resources are re-enabled.
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS6: Biodiversity conservation and sustainable management of living natural resources ESSS9: Biodiversity conservation and sustainable management of living natural resources and resilience
	EHS Guidelines; EHS Guidelines for Electric Power Transmission and Distribution – Section 1.0 Industry Specific Impacts and Management: 1.1– Environmental: Terrestrial habitat alteration; Aquatic habitat alteration
	Resolution no. 42/06 of 26 July - National Strategy and Action Plan for Biodiversity Resolution no 1/10 of 14 January - National Policy on Forests, Wildlife and Conservation Areas Resolution no. 27/16 of 22 July – Implementation of the Convention on Wetlands Executive Decree no. 433/16 of 26 October – Validation of the Certificate of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Law no. 6/17 of 24 January - Forest and Wildlife Law Executive Decree no. 252/18 of 13 July – Approval of the Red List of Species for Angola Presidential Decree no. 171/18 of 23 July - Forestry Regulation

5.3.6.1 Pre-Construction Measures

Management measure	Detailed Description	Responsibility
Specifications	– The project final design must ensure that all infrastructure within the vicinity of the Bicuari National Park are kept at a minimum distance of 500 m of this protected area and existing tracks are to be used. If there is any need to deviate from the proposed alignment, this change can only occur west of the current centreline which is further away from the Park. – Ensure that all impacts on the local ecosystems and natural capital are kept to a minimum.	Contractor

Management measure	Detailed Description	Responsibility
	– An ecological specialist must undertake a walk-down of the full length of the transmission line to identify all sensitive areas and species that must be avoided during construction. This information shall inform the final site layout plan and No-Go areas (to be avoided and clearly marked before the start of construction activities in a certain area). c. – A representative from the local community should accompany the specialist on the walkdown to assist with identification of flora of importance. – This report should also detail the training requirements to ensure the protection of natural resources, including the identification and proper management of relevant local flora and fauna, including dangerous species and alien invasive species. – An ecologist must compile a booklet to assist in the identification of protected tree species, which can support the training of Contractor's personnel during construction, as well as the RNT operational staff during maintenance activities. – The specialist report must include the location and specifications of all required bird flight diverters (BFDs) (e.g. coils, flappers) to be installed on the proposed transmission line in the following areas (refer to Figure 11.2, Figure 11.3 and Figure 11.4): – **High Risk** – Cunene River; Caculuvar River and Granite inselbergs – **Medium Risk** – the ephemeral rivers/pan systems in Munano/Uvaie area (west of the Bicuar National Park); north-east of Cahama and in Calovango area. – Bird flight diverters must be installed in accordance with any RNT policies available at the time or, in the absence of this, other best practice guidelines such as the 'Utilisation of bird flight diverters on Eskom overhead lines' (Eskom, 2015), and must be installed as soon as the conductors are strung. – All areas that may need additional management measures (sensitive areas) or areas that might pose a threat if mishandled (such as areas infested with aliens), must be identified and geo-referenced, and appropriate mitigation/management measures need to be included in the construction conditions and constraints. This includes the identification of buffer areas to inform the maintenance activities within the servitude. – This report also needs to include other measures considered necessary to protect the ecosystems and/or prevent damage to infrastructure, such as installation of protection against faunal collision/electrocution (giraffes, baboons, etc.), placement of skirtings of loose rocks (diameter of 2-3 m) around pylon infrastructures in known elephant routes (to prevent them from using the pylons as rubbing posts as it poses risk of electrocution and potential damage to pylon structure), etc. – Locate the construction camps in disturbed areas instead of disturbing new areas, and as far as possible from watercourses and sensitive habitats.	
Avoidance	– During construction, no activities are to interference with the Bicuari National Park. This includes the location of any camps, accommodation or roads, which must be located as far as possible from the park. – Identify and avoid sensitive habitats (e.g. wetlands) when locating pylons and access roads in the detailed design stage of the project. – Identify and avoid sensitive habitats (informed by walk-down) when locating construction sites - e.g. Cunene and Caculuvar Rivers, ephemeral drainage lines and fountains and associated riparian vegetation, rocky ridges/inselbergs, etc.	

Management measure	Detailed Description	Responsibility
	– Identify existing tracks/roads that can be used for construction activities, thus avoiding affecting undisturbed areas.	
Mitigation/ Reduction	N/A	
Stop work	N/A	

5.3.6.2 Construction and Decommissioning Measures

5.3.6.2.1 Loss, or disturbance, of flora and habitats (terrestrial and aquatic)

Management measure	Detailed Description	Responsibility
Specifications	– Ensure that all impacts on the terrestrial and aquatic flora and habitats are kept to a minimum.	Contractor
Avoidance	– Clearly mark all identified No-Go areas before the start of any construction activities in a certain area of the corridor. – Removal of vegetation and topsoil may only occur in increments and be done up to two weeks before actual construction commences in an area. – No burning of vegetation will be allowed. – Remove/relocate species of conservation value (identified in the walk-down report) where possible and practical. – Where vegetation consists of grasses, bulbs and shrubs, it should be cleared (i.e. complete removal of the vegetation with its root system) as part of the removal of topsoil (i.e. to a maximum depth of 30 cm) in order to maximise organic content and the available seedbank in the rehabilitation soil. – Only the bigger tree species and/or individuals potentially causing problems to the transmission line servitude should be removed, and all vegetation that will not interfere with the line should not be cleared. – Damage to protected tree species must be avoided at all costs but, where unavoidable, a permit is required. A booklet to assist in the identification of protected tree species must be generated during the pre-construction phase to support this action. – Damage to all Aloe species, such as *Adenia pechuelii*, *Adenium boehmianum*, etc., is to be avoided and, if not possible, affected specimens of these plants must be relocated to a similar habitat along the route. No collection of these species for resale should be allowed. – The CLO should consult the adjacent communities to establish whether they wish to use any cut vegetation from bush clearing activities. If not, it should be disposed of in a manner that does not pose a fire risk to infrastructure and in accordance with any RNT policies on bush clearing that become available. – Implement erosion control measures provided in Sections 5.3.2.2 and 5.3.3.2, that refer to Water Resources and Soil Management Plans respectively, especially in sensitive habitats, on steep slopes, in areas with fields/crops or through/adjacent to water sources, and those with important floral species and habitats (identified in the walk-down report).	

Management measure	Detailed Description	Responsibility
	– All measures referring to water and soil protection against pollution and contamination, set out in Sections 5.3.2.2 and 5.3.3.2, must be adhered to. – Ensure that existing tracks/roads are used as far as possible throughout the construction phase. – In the worker's environmental awareness training, include a module on protected and dangerous species (fauna and flora), how to identify and protect these, and how to avoid the harmful ones, as set out in Section 6. – All chemicals used need to be duly handled, stored and disposed of, as set in Section 5.3.8 and 5.3.13 that refer to the Pesticide and Waste Management Plans respectively.	
Mitigation/ Reduction	– Ensure that topsoil is removed and conserved in order to ensure the success of the rehabilitation (also see Section 5.3.3.2). – All areas disturbed and affected by the construction works and no longer in use (temporary footprints) must be rehabilitated as soon as possible. The sequence for rehabilitation should be as follows: decompaction and reshaping of the affected areas, laying of the previously-removed and stored topsoil (layer between 15 cm to 30 cm), raking and smoothing of the soil to ensure adherence to subsoil, and reseeding, followed by watering regime as agreed with the ECO. – Any area disturbed outside the approved construction footprint must be reinstated at the Contractor's cost and to the satisfaction of the ECO. – Implement a policy of "no tolerance" towards any invasive alien plant species encountered in the area (e.g. *Opuntia* spp., etc.). This should include the removal and destruction of these species throughout the proposed development areas. Such activity would be beneficial to the overall ecology of the area, as set out in Section 5.3.7 that refers to The Alien Invasive Management Plan. – The planting of any potentially alien invasive plant species (e.g. *Tecoma stans, Pennisetum setaceum*, etc.) is prohibited. If there is any requirement for the use of ornamental plants (e.g. localised areas within the substation) then the vegetation to be used should be selected from the range of local natural species.	
Stop work	– Should the Contractor fail to remain within the approved construction footprint or intentionally/negligently causes damage to a natural feature/vegetation in a sensitive area, the ECO reserves the right to request punitive measures or the suspension or partial suspension of construction via instruction from the Engineer, in order to allow for the assessment, reporting and rectification of the impact. – The aforementioned will be determined by the type and significance of the non-conformance and the risk of it recurring, should construction proceed.	

5.3.6.2.2 Loss, or disturbance, of fauna (terrestrial and aquatic)

Management measure	Detailed Description	Responsibility
Specifications	– Ensure that all impacts on terrestrial and aquatic fauna are kept to a minimum.	Contractor
Avoidance	– Clearly mark all identified No-Go areas before the start of any construction activities in a certain area of the corridor and ensure that workers respect these.	

Management measure	Detailed Description	Responsibility
	– The collection of firewood by site staff is not permitted. – Do a site walk-down prior to construction commencing in a certain area to remove any slow-moving animals, identify and protect nesting sites, burrows etc., and to prevent the destruction of habitat trees – e.g. dead trees and old specimens (i.e. habitats for cavity and bark dwellers such as geckos, snakes, bats, genets, galagos, etc who utilise them). These areas must be demarcated as No-Go areas, wherever possible, and any disturbance to these should be avoided (especially raptor breeding sites). – Make sure that existing tracks/roads are used where possible throughout the construction phase. Avoid off-road driving and nocturnal driving as this may result in the death of slow-moving reptiles and mammals, especially nocturnal species. – Implement and maintain track discipline with maximum speed limits (e.g. 40 km/h) as this results in fewer reptile road mortalities and associated dust pollution emissions. – In the worker's environmental awareness training module, include information on protected and dangerous species (fauna and flora), how to identify and protect these, and how to avoid the dangerous ones, as set out in Section 6. – Prevent the illegal collection for food and trade (e.g. birds, chameleon, tortoises, giant bullfrog, egg collection), poaching, and killing of perceived dangerous species (e.g. all snakes and mammalian predators/carnivores), with appropriate training and monitoring. – No domestic animals may be allowed on the construction sites and the feeding of wildlife must be prohibited. – Ensure that the Waste Management Plan (Section 5.3.13) is strictly adhered to as littering can result in certain animals becoming accustomed to humans and their associated activity – e.g. baboon, black-backed jackal, etc.	
Mitigation/ Reduction	– Before commencing daily construction activities, excavations and holes that may serve as shelter to any animal, should be inspected, and all trapped/hidden fauna should be removed for relocation. – All areas disturbed and affected by the construction works and no longer in use (temporary footprints) must be duly rehabilitated, as set out in Section 5.3.6.2.1. – Ensure that after finalising all construction activities in an area adjacent to water resources, rehabilitation also includes erosion prevention of in-siltation which may affect aquatic-dependent fauna such as amphibian breeding, etc. – Report any animal fatalities of significance to the ECO and relevant nature reserve/protect area management (where applicable) and identify measures to avoid recurrence.	
Stop work	– Refer to constraints set out in Section 5.3.6.2.1.	

5.3.6.3 Operational Measures

5.3.6.3.1 Loss, or disturbance, of flora and habitats (terrestrial and aquatic)

Management measure	Detailed Description	Responsibility
Specifications	– Ensure that all impacts on the terrestrial and aquatic flora and habitats are kept to a minimum.	RNT
Avoidance	– Ensure that existing tracks/roads are used for all required maintenance operations.	

Management measure	Detailed Description	Responsibility
	– Eradicate any invasive alien plants encountered along the line route, as set out in Section 5.3.7 that refers to the Alien Invasive Management Plan. – Restrict public access from the surrounding roads to the servitude by using a deterrent structure (e.g. boom, stockpiled brush or earth berm). – The Grievance Mechanism proposed in Section 8 should also serve as a tool for reporting outsiders who are misusing natural resources, such as illegal logging or poaching. – Within the maintenance activities, only remove individual trees that pose a threat to the infrastructure and do not eliminate all existing vegetation within the line route/servitude. – Damage to protected tree species must be avoided at all costs and, where unavoidable, a permit is required. A booklet to assist in the identification of protected tree species must be generated during the pre-construction phase to support this. – The CLO should consult the adjacent communities to establish if they wish to use any cut vegetation from bush clearing activities. If not, it should be disposed of in a manner that does not pose a fire risk to infrastructure, and in accordance with any RNT policies on bush clearing that become available. – No burning of vegetation will be allowed. – Chemicals should be used judiciously if/when used for the maintenance of the line servitude. All chemicals used need to be duly handled, stored and disposed of, as set in Section 5.3.8 and 5.3.13.	
Mitigation/ Reduction	– Implement the erosion control measures provided in Sections 5.3.2.2 and 5.3.3.2, should monitoring identify the need for corrective measures. – Ensure that persons handling pesticides have undergone formal training and are adequately equipped to undertake operation in a responsible and safe fashion. – Continue with the “no tolerance” policy towards invasive alien species. Should these be detected within the monitoring of the line servitude, ensure removal and destruction as set out in Section 5.3.7, that refers to the Alien Invasive Management Plan.	
Stop work	N/A	

5.3.6.3.2 Loss, or disturbance, of fauna (terrestrial and aquatic)

Management measure	Detailed Description	Responsibility
Specifications	– Ensure that all impacts on terrestrial and aquatic fauna are kept to a minimum.	RNT
Avoidance	– Make sure that existing tracks/roads are used for all required maintenance operations and maintain track discipline with maximum speed limits (e.g. 40 km/h) to prevent reptile road mortalities and dust emissions. – Restrict public access from the surrounding roads to the servitude by using a deterrent structure (e.g. boom). – The Grievance Mechanism proposed in Section 8 should also serve as a tool for reporting outsiders who are misusing natural resources, such as poaching.	

Management measure	Detailed Description	Responsibility
Mitigation/ Reduction	– Should the monitoring plan identify a location/area within the line servitude where there are problems with fauna or high animal mortality, correctional measures need to be assessed and implemented.	
Stop work	N/A	

5.3.6.3.3 *Increased risk of avifaunal mortalities due to collisions and electrocution*

Management measure	Detailed Description	Responsibility
Specifications	– Ensure that all impacts on avifauna due to collisions and electrocution are kept to a minimum.	RNT
Avoidance	– Ensure that all specifications recommended by the Ecology specialist, as set out in Section 5.3.6.1, are put in place.	
Mitigation/ Reduction	– Should the monitoring plan identify a location/area within the line servitude where there is a very high rate of bird mortalities, correctional measures need to be assessed and implemented.	
Stop work	N/A	

5.3.7 *Alien Invasive Species Management Plan*

Identified impacts/risks	1. Potential spread of alien invasive floral species 2. Accidental contamination of line corridor/servitudes by alien invasive species
Objectives of improved management	1. Ensure that all alien invasive flora is under control and that rehabilitation is put in place in a way that avoids potential infestation and/or re-infestation 2. Prevent and remediate the occurrence of any accidental spreading of alien invasive species
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS6: Biodiversity conservation and sustainable management of living natural resources ESSS9: Biodiversity conservation and sustainable management of living natural resources and resilience
	EHS Guidelines; EHS Guidelines for Electric Power Transmission and Distribution – Section 1.0 Industry Specific Impacts and Management: 1.1– Environmental: Terrestrial habitat alteration; Aquatic habitat alteration
	Resolution no. 42/06 of 26 July - National Strategy and Action Plan for Biodiversity Executive Decree no. 252/18 of 13 July – Approval of the Red List of Species for Angola Presidential Decree no. 171/18 of 23 July - Forestry Regulation

5.3.7.1 Construction and Decommissioning Measures

Management measure	Detailed Description	Responsibility
Specifications	– All alien invasive flora must be kept under control and rehabilitation undertaken in a way that avoids potential infestation and/or re-infestation, i.e. retain the *status quo* along the line route and prevent and remediate the occurrence of any accidental spreading of alien invasive species, as currently no such species have been identified.	Contractor
Avoidance	– All areas disturbed and affected by the construction works and no longer in use (temporary footprints) must be immediately rehabilitated, as set out in Section 5.3.6.2.1. In no circumstances should these areas be rehabilitated with invasive alien vegetation, only indigenous vegetation may be used for this purpose. If there is a need to import material from outside of the construction area (fill materials, topsoil, etc.), this must be free of weeds. – All topsoil and subsoil stockpiles must be checked for emerging weeds on a regular basis (see Section 5.3.3.2).	
Mitigation/ Reduce	– Implement a policy of "no tolerance" towards any invasive alien plant species encountered in the area (e.g. *Prosopis* spp., etc.). This includes the removal and destruction of these species throughout the proposed line servitude, access roads and construction camp sites. – If there is a need to remove invasive alien species, the ECO should advise on the rehabilitation required at the site in order to avoid potential re-infestations and/or erosion occurring. – The planting of any potentially alien invasive plant species (e.g. *Tecoma stans, Pennisetum setaceum*, etc.) is prohibited and, if there is any requirement for the use of ornamental plants (e.g. localised areas within the substation), the vegetation to be used should be selected from the range of local natural species. – If during construction the presence of alien invasive species is observed, this should be documented – i.e. species and location – and the information must be forwarded to the RNT Environmental Department. The Ministry of Environment (MINAMB) should also be informed of any major infestations so that clearing programmes may be initiated.	
Stop work	– If it is detected that the import materials (filling materials, topsoil, subsoil, etc.) are infested with weeds, the ECO reserves the right to suspend, or partially suspend, construction, via instruction from the Owner's Engineer in order to allow for the assessment, reporting and rectification of the problem.	

5.3.7.2 Operational Measures

Management measure	Detailed Description	Responsibility
Specifications	– Prevent and remediate the occurrence or accidental spreading of alien invasive species.	RNT
Avoidance	– Complete an incident report after inspection/maintenance activities along the transmission line, which includes the presence and location of any identified invasive alien plant species. This should then innitiate an immediate response to eradicate the plants observed.	
Mitigation/ Reduction	– If during maintenance operations, and or monitoring of the line servitude, the presence of alien invasive species is observed, this must be documented (species and location) and the information must be forwarded to the RNT Environmental Department. The Ministry of Environment (MINAMB) should also be informed of any major infestations so that clearing programmes may be initiated as soon as possible.	

Management measure	Detailed Description	Responsibility
	– All areas affected by erosion must be immediately rehabilitated, as set out in Section 5.3.6.2.1. Under no circumstances may these areas be rehabilitated with invasive alien vegetation.	
Stop work	N/A	

5.3.8 Hazardous Materials Management Plan (including Pesticides and Herbicides)

Identified impacts/risks	1. Potential contamination of water, soil and other natural resources 2. Potential effect on natural processes, namely on flora, fauna and human health
Objectives of improved management	1. Ensure that the all hazardous material (including pesticides and herbicides) used are properly selected for the end-purpose, handled, stored and disposed of in a responsible manner, in order to guarantee that there is no contamination of any natural resource 2. Ensure that all hazardous material (including pesticides and herbicides) meet the end-purpose, do not include any banned substances that have a non-selective residual effect, and which may be harmful to human health, and limit environmental or social collateral damages.
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS 3: Resource efficiency and pollution prevention ESSS10: Resource efficiency, pollution prevention and management
	PS6: Biodiversity conservation and sustainable management of living natural resources ESSS9: Biodiversity conservation and sustainable management of living natural resources and resilience
	EHS Guidelines: General EHS Guidelines – Section 1 Environmental: 1.5 Hazardous material management EHS Guidelines: General EHS Guidelines – Section 2 Occupational health and safety: 2.4 – Chemical hazards EHS Guidelines: General EHS Guidelines – Section 3 Community health and safety: 3.5 Transport of hazardous materials EHS Guidelines: EHS Guidelines for Electric Power Transmission and Distribution – Section 1.0 Industry Specific Impacts and Management: 1.1– Environmental: Hazardous materials EHS Guidelines; EHS Guidelines for Electric Power Transmission and Distribution – Section 1.0 Industry Specific Impacts and Management: 1.2– Occupational health and safety: Exposure to chemicals
	Presidential Decree no. 190/12 of 24 August - Regulation on Waste Management

5.3.8.1 Pre-construction

Management measure	Detailed Description	Responsibility
Specifications	– The Contractor shall review and adjust this Hazardous Materials Management Plan, taking into consideration the planned construction activities and site-specific constraints. This plan must include all measures to ensure the proper transport,	Contractor

Management measure	Detailed Description	Responsibility
	storage, handling and disposal of all chemicals and potentially hazardous materials. Workers handling and using biocides must have the necessary training and current certificates. – The Hazardous Materials Management Plan must include a Contingency Plan that outlines the established procedures and the available equipment to respond to spills during construction activities and should, at a minimum, achieve the following: • Establish procedures for responding to oil spills and spills of other hazardous materials; • Identify potential sources of spills and the measures in place to control them; • Provide information about the location of spill-response equipment throughout the construction site; • Include maps showing the location of chemical, oil, and hazardous waste storage locations, structures and equipment for diversion and containment of spills, and the location of spill-response equipment; • Define the roles and responsibilities of all personnel involved in responding to spills; • Clearly define immediate actions to be taken to address spills; • Discuss the measures for containment, clean-up, and disposal of contaminated materials and soil; • Clearly describe the notification requirements for both internal spill-response teams and outside emergency personnel, and provide contact information for these individuals, along with contact details of local emergency agencies; and • Establish documentation procedures for identifying the root causes, devising corrective and preventative actions, and setting time lines for their implementation. – This Hazardous Materials Management Plan must comply with RNT's Policies and procedures stated above.	
Avoidance	N/A	
Mitigation/ Reduction	N/A	
Stop work	N/A	

5.3.8.2 Construction and Decommissioning Measures

5.3.8.2.1 Hazardous materials

Management measure	Detailed Description	Responsibility
Specifications	– Ensure that all hazardous materials used on the construction site are properly selected for the end-purpose, and handled, stored and disposed of in the appropriate manner.	Contractor
Avoidance	All hazardous materials: – Keep a record of all hazardous substances stored on site, including their intended use. – All hazardous materials must be stored under lock and key, in a clearly demarcated, bunded area, in an appropriate manner so as to prevent contamination of the site. These areas shall be isolated from all other activities and be clearly	

Management measure	Detailed Description	Responsibility
	marked with appropriate symbolic safety signs, and have adequate ventilation and PPE and emergency equipment on hand. The containers and emergency equipment/materials must be inspected at regular intervals for any leaks. – Use proper non-drip dispensing equipment and containers for hazardous products and store the dispensing equipment in weatherproof containers when not in use. – Reactive substances, which may lead to explosions, fires, emission/creation of noxious gasses, or other dangerous conditions, shall be stored and handled separately from one another, and in such a manner that no contact can occur with each other. – Hazardous substances shall be stored in such a way that they are not exposed to heat, radiation or moisture or any environmental condition which may increase the risk of dangerous events, such as an explosion, fire, etc. – All containers shall be clearly labelled to indicate the content and dangers thereof. A copy of the MSDS shall be kept on file with the Health and Safety Officer. – Ensure compliance with international good practice guidelines[1] when installing and operating fuel storage infrastructure (including hydrocarbon storage facilities) - these standards make provision for observation wells, leak detectors, overfill protectors, etc. As a minimum, all fuel tanks should be contained within an impervious bund wall (sized to 110% of the entire volume of the substance stored therein) and properly sealed containers to prevent leaks in the event of an accidental spill, and an oil/water separator should be fitted to the outlet valve. – The handling and use of hazardous materials/chemicals may only be undertaken by competent staff who have the necessary training and certificates for handling and using said materials, and associated PPE and emergency equipment. – Use proper non-drip dispensing equipment and containers for hazardous products, and store the dispensing equipment in weatherproof containers when not in use. The disposal of all hazardous materials/chemicals and contaminated containers must be done at a facility that is duly licenced to dispose/handle/treat such material in a safe and appropriate manner. Empty chemical containers should be returned to the supplier. – The transport of hazardous materials/chemicals to and from the construction site, and even within the construction area (e.g. from storage, to the place where it will be used that day), must be made by a person properly trained for this task and in a suitable vehicle. – There must be record-keeping of all hazardous materials for all stages of the material use – receipt, use, storage, on-site disposal, transport and final disposal/treatment. A copy of the waste disposal certificates must be obtained and filed accordingly. Cement / concrete batching: – Concrete shall be batched on an impervious surface or tray, or other suitable lining material, to prevent contamination of the soil and/or waterbodies. – Runoff from the cement/concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated (allowed to settle and pH corrected), or disposed of off-site at a location approved by the ECO.	

[1] For example South African Bureau of Standards (SABS) 089, 1535, 0131, 0108 and 0400 could be used.

Management measure	Detailed Description	Responsibility
	– All spills must be contained and adequately cleaned-up, and contaminated materials disposed of via an official facility or bioremediated to the ECO's acceptance. The Contractor must ensure absorbent and/or clean-up kits (spill kits) are readily available on site to clean up any spillages, as stipulated in the Contingency Plan. – Use only designated washing areas for equipment used for concrete work, with the necessary mechanisms in place to retain contaminated runoff and allow for the necessary treatment/filtering of polluted water. Concrete settling/evaporation pond residue must be recovered for disposal in a landfill.	
Mitigation/ Reduction	– Ensure oily wastewater from wash bays undergo treatment in a two-stage oil separator before being discharged to a lined detention pond and eventually discharged to the environment. – Ensure that emergency spill kits are available at strategic locations (including mobile fuel bowsers) with competent people with the necessary training available to use it in the case of accidental spillages. – The Contractor must report major incidents to the ECO within 2 hours. Any spill incidents must be cleaned up immediately and in accordance with the emergency procedure stated in the Contingency Plan. – Use designated washing areas for all equipment used for concrete work, with the necessary mechanisms in place to retain contaminated runoff and allow for the necessary treatment/filtering of polluted water. – Concrete spills will be allowed to harden and be removed within 2 days for re-use, or disposal at an appropriate site or used in fill as approved by the ECO/Engineer.	
Stop work	– Unauthorised/unpredicted release of contaminated water into the soil or watercourses. – Repeated mismanagement of waste concrete and/or cement-laden runoff can result in the suspension of bulk concrete batching activities on instruction from the ECO/Engineer until non-conformances have been rectified to the ECO/Engineer's satisfaction. – Should a major spill occur, the ECO/Engineer reserves the right to suspend, or partially suspend, construction by means of an instruction from the Engineer in order to allow for the assessment, reporting and rectification of the impact. – Depending on the severity of the non-conformance and degree of negligence by the Contractor, the ECO will also inform the relevant competent authority to confirm the Contractor's liability to be prosecuted and/or fined.	

5.3.8.3 Operational Measures

5.3.8.3.1 Hazardous materials

Management measure	Detailed Description	Responsibility
Specifications	– Follow RNT's Policies and procedures.	RNT
Avoidance	– All hazardous materials (such as fuels and insulating oils) should be appropriately separated and stored in designated areas, with appropriate emergency provisions, warning signage, demarcation and entry restrictions. Where appropriate, petrochemicals and other hazardous liquids, should be stored in contained areas, surrounded by berms or concrete containment, so as to restrict the movement of hazardous substance into the terrestrial or aquatic environments in the event of spills or leaks. Maintenance/repair vehicles/teams must carry necessary PPE and emergency spill kits to deal with, and recover, accidental spills in the field.	
Mitigation/ Reduction	– Ensure that emergency spill kits are present at strategic locations with staff available who have the necessary training, to use the kits in the case of accidental spillages. Any spill incidents must be cleaned up immediately. Contaminated materials must be recovered from the field and disposed of responsibly.	
Stop work	N/A	

5.3.8.3.2 Pesticides and herbicides

Management measure	Detailed Description	Responsibility
Specifications	– General provisions: • Herbicides should be avoided where possible and only used as a last resort, and with caution, where absolutely necessary. • Even "modern" herbicides have some effect on biodiversity and/or haven't yet been tested on all species, especially under local conditions and circumstances. It is thus important to remember that there are no 100% "safe" herbicides. – Should herbicides be required for bush clearing in exceptional circumstances, then the following applies: • Refer to Section 11.2 -specific details of herbicide application for bush clearing; • Do not apply herbicides within 100 m of a watercourse (to be identified during pre-application walk-down by ecologist in Section 5.3.6.1). • The application methods should stringently be adhered to. • Techniques should be employed and/or investigated that minimise impacts on non-target native species. • Herbicides that are deemed non-target specific and/or which are mobile (all granular products) should be avoided as these would kill trees indiscriminately. • Do not use paraquat and diquat as they a are toxic to animals. Product names for paraquat include: Crisquat, Cyclone, Dextrone, Dexuron, Gramoxone Extra, Herbaxone, Ortho Weed and Spot Killer and Sweep. Product names for diquat include: Aquacide, Aquakill, Dextrone, Diquat, Midstream, Reglone, Reglox, Reward, Tag, Torpedo, Vegetrole and Weedtrine-D.	RNT

Management measure	Detailed Description	Responsibility
	• Use of soil sterilant (i.e. tebuthiuron, ethidiumuron, bromacil, uracil and various others) with care as these can be considered products with potentially long-term effects on plant life. • Apply monitoring checklist in Section 11.2 and retain as proof. – Use only pesticides that are manufactured under licence, and registered and approved by the appropriate authority, and in accordance with the Food and Agriculture Organization's (FAO) International Code of Conduct on the Distribution and Use of Pesticides. – Use only pesticides that are labelled in accordance with international standards and norms, such as the FAO Revised Guidelines for Good Labelling Practice for Pesticides. – Avoid the use of pesticides that fall under the World Health Organization Recommended Classification of Pesticides by Hazard Classes 1a and 1b. - Avoid the use of pesticides listed in Annexes A and B of the Stockholm Convention, except under the conditions noted in the convention.	
Avoidance	– Use motor-manual methods for vegetation (and pest) clearance wherever possible, before using a biocide. Biocides should augment motor-manual methods, i.e. as stump treatment to prevent coppicing. – Train personnel to apply pesticides and herbicides and ensure that personnel have received applicable certifications, or equivalent training where such certifications are not required. Ensure that all personnel applying pesticides and herbicides also received the appropriate training with regard to pest identification, weed identification and field scouting. – Review the manufacturer's directions on recommended dosage or treatment, as well as published reports on using the reduced rate of pesticide and herbicide applications without loss of effect, and apply the minimum effective dose (i.e. using wetting agents). – Herbicides shall be applied with exceptional care (avoiding drift and overspray), especially with regard to dosages, as the incorrect use could harm and/or destroy non-target species. Techniques that minimise impacts on non-target native species (i.e. using dyes) should be employed and/or investigated. Herbicides that are non-target specific and/or mobile (all granular products) should be avoided, as these can kill trees indiscriminately. – Apply pesticides/herbicides based on certain criteria (e.g. field observations, weather data, time of treatment, and dosage) and maintain a logbook to record all relevant information, including their effectiveness. – Select application technologies and practices designed to reduce unintentional drift or runoff, only as indicated in the Pest-specific Management Plan, and under controlled conditions. Establish untreated buffer zones or strips along watercourses, rivers, streams and ditches to help protect water resources. – Herbicides should be used with caution (avoid use where possible and only use where absolutely necessary). – Store pesticides/herbicides in their original packaging, in a dedicated, dry, cool, frost-free, and well-aerated location that can be locked, and properly identified with signs, and with access limited to authorised people. No human or animal food may be stored in this location. The storeroom should also be designed with spill containment measures and sited in consideration of the potential for contamination of soil and water resources. – Mixing and transfer of pesticides should be undertaken by trained personnel in ventilated and well-lit areas, using containers designed and dedicated for this purpose.	

Management measure	Detailed Description	Responsibility
	– Containers cannot be used for any other purpose (e.g. drinking water). Contaminated containers must be handled as hazardous waste and treated accordingly. Disposal of these containers should be done in a manner consistent with FAO guidelines and with manufacturer's directions. – Purchase and store no more pesticide than needed and rotate stock using a "first-in, first-out" principle so that pesticides do not become obsolete. The use of obsolete pesticides should be avoided under all circumstances. – A management plan that includes measures for the containment, storage and ultimate destruction of all obsolete stock, should be prepared in accordance with guidelines of the FAO and be consistent with country commitments under the Stockholm, Rotterdam and Basel Conventions. – Ensure that protective clothing worn during pesticide/herbicide application is either cleaned or disposed of in an environmentally-responsible manner. – Contamination of soils, groundwater, or surface water resources, due to accidental spills during transfer, mixing, and storage of pesticides, must be prevented by following the hazardous materials storage and handling recommendations presented in Section 5.3.8.2.1.	
Mitigation/ Reduction	– Collect rinse-water from equipment cleaning for re-use (such as for the dilution of identical pesticides, to concentrations used for application). – High biodiversity areas and sensitive areas shall be cleared manually. No herbicides shall be allowed. – *Dichrostachys cinereal*-dominated areas shall be cleared manually and/or with herbicides. No mechanical clearing shall be allowed. All other areas that are sandy shall be cleared mechanically and/or with herbicides. All other areas that are rocky shall be cleared manually and/or with herbicides. – As aerial application of herbicides is unselective and kills trees indiscriminately over large areas, making it difficult to avoid protected and/or advantageous species, hand application methods should be preferred, as they are more selective and can eradicate the unselective killing of tree species. – Within the maintenance activities, only remove individual trees that pose a threat to the infrastructure, and do not eradicate all existing vegetation within the line route/servitude. – Should complaints be received, then water quality monitoring should be undertaken.	
Stop work	– N/A	

5.3.9 Heritage Resources Management Plan

Identified impacts/risks	1. Potential damage to ceremonial sites and places-of-power 2. Potential excavation and destruction of Tertiary and Quaternary fossils (palaeontological impacts) 3. Potential destruction of unidentified/sub-surface archaeological remains

Objectives of improved management	1. Ensure that the location of existing graves and burial sites are properly identified, managed and protected during the construction phase. 2. Ensure that the location of existing ceremonial sites and places-of power are properly identified, managed and protected during the construction phase. 3. Anticipate and avoid the destruction of palaeontological heritage (fossils). 4. Anticipate and avoid the destruction of archaeological remains.
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS8: Cultural heritage ESSS8: Cultural heritage
	EHS Guidelines; EHS Guidelines for Electric Power Transmission and Distribution – Section 1.0 Industry Specific Impacts and Management: 1.3 – Communal health and safety: Visual amenity
	Law no. 14/05 of 7 October - Cultural Heritage Law Decree no. 2/06 of 23 January - Architectural and Archaeological Heritage

5.3.9.1 Pre-Construction Measures

Management measure	Detailed Description	Responsibility
Specifications	– The only significant heritage sites directly observed were a community and a "children's" graveyard close to Lubango, the Pedra Vermelha Sagrada, or Sacred Red Stone, close to Cahama, and a stone cistern built over a water pit in Cavalango (Figure 11.5). No other specific sites have been identified at the time of preparation of this ESMP. It should also be noted that the identified impacts can, for the most part, be avoided through the execution of a pre-construction walk-down of the alignment. – Ensure that the location of all existing graves, burial sites, ceremonial sites and places-of-power are properly identified and demarcated. – Anticipate and avoid the destruction of palaeontological heritage or archaeological remains. – A heritage specialist must undertake a walk-down of the full length of the transmission line to identify all relevant heritage and cultural sites. Mapping of all heritage resources, current and identified by the walk-down survey, must be compiled in a GIS database for ease of access and to enhance planning, management (including conservation) and interpretation of these sites. This information shall inform the final site layout plan and No-Go areas (to be avoided and clearly marked before the start of construction activities in a certain area). – The specialist must be accompanied by representative/s from the local communities to assist in the identification of heritage and cultural sites; Sobas/elders must be involved as they hold this knowledge. – The updated Heritage Resources Management Plan must include the location and specifications of all required mitigation and avoidance measures to be applied, namely: • Any Stone Age Sites identified during the proposed walk-down must be indicated on the development map and mitigated as per its significance. • No activities should interfere or conflict with the intangible heritage of the inhabiting communities, i.e. ceremonial sites, places-of-power, etc. • Any construction camps, or similar infrastructure impacts, should be evaluated against the recorded heritage sites and adapted to conform to the requirements of this management plan. • Detailed plans should be compiled for conservation measures at heritage sites with high significance, and where they are in direct danger of being affected by the proposed development. • Detail the training requirements to ensure that "chance finds" protocol for fossils and archeologic sites is duly followed during construction operations, specifically in activities such as bush clearing and earthworks. • Detail the training requirements to ensure that any heritage site, ceremonial site or place-of-power is duly respected, and all the workers know the required protocols and rules of behaviour. – Recommendations for future management interventions, to address the issues related to increased accessibility to heritage resources as a result of the development (i.e. access roads, etc.), should also be included. These include: • Research Policy Strategy (for newly accessible areas); • Rural inhabitant education in terms of the value of heritage resources and the need for their protection and conservation; and • Interpretation strategy (in terms of the specific heritage significance of each site/area).	Contractor

Management measure	Detailed Description	Responsibility
	– Locate the construction camps in disturbed areas, instead of disturbing new areas	
Avoidance	– No development or construction activities should destroy, interfere or conflict with the intangible heritage related to graves and sacred sites.	
Mitigation/ Reduction	– The investigation of the existence of these sites should also be supported in the stakeholder engagement process. – Should any need relocation, some consecration ceremonies might apply, which need to be investigated and agreed on with the local population.	
Stop work	N/A	

5.3.9.2 Construction and Decommissioning Measures

5.3.9.2.1 Damage to ceremonial sites and places-of-power

Management measure	Detailed Description	Responsibility
Specifications	– All construction activities must be regularly monitored by a heritage specialist (a qualified person with recognised heritage training to monitor and report on the construction activities). – No activities should interfere or conflict with the intangible heritage of the inhabiting communities, i.e. ceremonial sites, places-of-power, etc.	Contractor
Avoidance	– Clearly mark as No-Go areas, all identified ceremonial sites and places-of-power. – Include in the worker's training, a module on environmental awareness that also contemplates information on how to identify, preserve and avoid the local cultural heritage, as set out in Section 6.	
Mitigation/ Reduction	– All identified heritage sites should clearly be marked as No-Go areas, and be monitored and incorporated into the training and awareness material to ensure that there are no impacts on these sites.	
Stop work	– Should the Contractor fail to remain within the approved construction footprint, or intentionally/negligently cause damage to a ceremonial site or place-of-power, the ECO reserves the right to suspend, or partially suspend, construction by way of an instruction from the Implementing Agent in order to allow for the assessment, reporting and rectification of the impact.	

5.3.9.2.2 Excavation and destruction of Tertiary and Quaternary fossils

Management measure	Detailed Description	Responsibility
Specifications	– Where certain activities are to be undertaken that involve protected places and objects, any permits required under Law no. 14/05 of 7 October - Cultural Heritage Law, must be obtained. – A "chance find" protocol must be implemented in the event that previously-unknown archaeological sites, fossils or fossil sites are exposed or found during the construction phase. – Any finding should, as soon as practically possible, be reported to the Ministry of Culture.	Contractor

Management measure	Detailed Description	Responsibility
	– Surface excavations should continuously be monitored by the ECO and, should any fossil or archaeological material be unearthed, the excavation must be halted, and all construction in the immediate vicinity (within a 50 m radius of the site) should cease. – If archaeological or fossiliferous material has been disturbed during the excavation process, it should be set aside to prevent it from being destroyed. – The ECO must then take a GPS reading of the site and digital photographs of the fossil material and the site from which it came. – The ECO must then contact a palaeontologist and supply this specialist with the information (locality and pictures) so that the importance of the find can be assessed and recommendations made. – If the palaeontologist is convinced that this is a major find, an inspection of the site must be scheduled as soon as possible in order to minimise delays to the development. From the photographs and/or the site visit, the palaeontologist will make one of the following recommendations: • The material is of no value, so construction activities in that site can proceed, or • Fossil material is of some interest and a representative sample should be collected and set aside for further study and be incorporated into a recognised fossil repository after a permit is obtained from the relevant authorities (Angola) for their removal, after which the construction activities may proceed, or • The fossils are considered scientifically important and the palaeontologist must obtain a permit to excavate the site and take them to a recognised fossil repository, after which the construction activities may proceed. – If any fossils are found, a schedule of monitoring should be set up between the Owners Engineer /RNT and a palaeontologist, in case of further discoveries.	
Avoidance	– Clearly mark as No-Go areas all fossil sites identified and considered relevant. – Include in the worker's training, a module on environmental awareness that also contemplates information on how to identify, preserve and avoid destruction of fossil sites, as set out in Section 6.	
Mitigation/ Reduction	– All identified heritage sites should clearly be marked as No-Go areas, be monitored, and incorporated into the training and awareness material to ensure that there are no impacts on these sites	
Stop work	– Should the Contractor fail to remain within the approved construction footprint, or intentionally/negligently cause damage to an identified fossil site, the ECO reserves the right to suspend, or partially suspend, construction by means of an instruction from the Implementing Agent in order to allow for the assessment, reporting and rectification of the impact.	

5.3.9.2.3 Destruction of unidentified/sub-surface archaeological remains

Management measure	Detailed Description	Responsibility
Specifications	– Where certain activities are to be undertaken that may involve protected places and objects, any permits required under Law no. 14/05 of 7 October (Cultural Heritage Law), and Decree no. 2/06 of 23 January (Architectural and Archaeological Heritage) must be obtained. – A protocol, similar to the chance finding of fossils, set out in Section 5.3.9.2.2, should be followed for the preservation of any unidentified/sub-surface archaeological remains. These remains of heritage sites could be encountered during the	Contractor

Management measure	Detailed Description	Responsibility
	construction activities and would offer no surface indication of their presence. However, the following indicators of unmarked sub-surface archaeological sites could be present: • Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate); • Bone concentrations, either animal or human; • Ceramic fragments such as pottery shards, either historic or pre-contact; and • Stone concentrations of any formal nature. – Operators of excavation equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should be followed should they be encountered: • The assigned project heritage practitioner should be informed immediately; • In the event of obvious human remains, the local Angolan Police Services should be notified; • All works within a 50 m radius of the find must stop, and no measures should be attempted to mitigate the disturbance (such as refilling etc.); • The area must be clearly marked, treated as a No-Go area until a proper investigation on the actual significance of the site is conducted, and the area should be placed under guard; and • No media statements should be released until the heritage practitioner has had sufficient time to analyse the finds.	
Avoidance	– Clearly mark as No-Go all areas identified as archaeological sites. – Include in the worker's training, a module on environmental awareness that also contemplates information on how to identify, preserve and avoid destruction of fossil sites, as set out in Section 6.	
Mitigation/ Reduction	– All identified heritage sites should clearly be marked as No-Go areas, be monitored, and incorporated into the training and awareness material to ensure that there are no impacts on these sites.	
Stop work	– Should the Contractor fail to remain within the approved construction footprint, or intentionally/negligently cause damage to sub-surface archaeological sites, the ECO reserves the right to suspend, or partially suspend, construction by means of an instruction from the Engineer in order to allow for the assessment, reporting and rectification of the impact.	

5.3.9.3 Operational Measures

Management measure	Detailed Description	Responsibility
Specifications	N/A	RNT
Avoidance	N/A	
Mitigation/ Reduction	– Known heritage sites/resources located near the access routes should be monitored for potential impacts resulting from erosion linked to the traffic on these routes.	
Stop work	N/A	

5.3.10 Grave Relocation Management Plan

Identified impacts/risks	1. Potential damage to graves and burial sites
Objectives of improved management	1. Ensure that the location of existing graves and burial sites are properly identified, managed and protected during the construction phase, preferably through avoidance, and only resorting to relocation as a last option.
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS8: Cultural heritage ESSS8: Cultural heritage
	EHS Guidelines; EHS Guidelines for Electric Power Transmission and Distribution – Section 1.0 Industry Specific Impacts and Management: 1.3– Communal health and safety: Visual amenity

5.3.10.1 Pre-Construction Measures

Management measure	Detailed Description	Responsibility
Specifications	– As per information collected during the stakeholder engagement process, grave relocation should be avoided at all costs, as the local population, and specifically the indigenous peoples, are unsure as to how to deal with this kind of relocation. – The only burial grounds identified to date were a community and a "children's" graveyard close to Lubango, (Figure 11.5). No other specific sites were identified or described, and the impacts stated here are based on sites that may most likely be encountered. It should also be noted that these impacts can, for the most part, be avoided through the execution of a pre-construction walk-down of the alignment, as recommended. – These locations must be further investigated during the walk-down survey of the final alignment, referred to in Section 5.3.9.1, to assist with avoiding graves, or exhumation and relocation, as part of the resettlement activities. Should any further burial sites be identified in the walk-down survey, or during the project's stakeholder engagement process, the mitigation should also be included in the updated Heritage Resources Management Plan (Section 5.3.9.1), which should include a Grave Relocation Plan, should there be the need for one. – After identification of burial grounds, these should be mapped, preferably in a GIS platform, in order to inform the detailed design stage of the project. Buffer zones and possible secondary impacts should be identified and indicated. – All recommendations resulting from the Heritage Resources Management Plan should also be integrated into the Resettlement Action Plan (to be developed at a later stage of the project). If absolutely necessary, grave relocation procedures should be reported, and managed timeously, due to the extended schedules these activities can have.	Contractor
Avoidance	– Grave relocation should be avoided at all costs.	
Mitigation/ Reduction	N/A	

Management measure	Detailed Description	Responsibility
Stop work	N/A	

5.3.10.2 Construction and Decommissioning Measures

Management measure	Detailed Description	Responsibility
Specifications	– Access by next of kin (NoK) should not be hindered by activities or infrastructure associated with the development.	Contractor Social / Heritage Specialists
Avoidance	– Clearly mark as No-Go areas all identified burial sites. – Include in the worker's training, a module on environmental awareness that also contemplates information on how to identify, preserve and avoid the local cultural heritage, as set out in Section 6.	
Mitigation/ Reduction	– Any grievances regarding issues surrounding grave relocations, or the choice of NoK, must be handled on a case-by-case basis between the CLO and the Heritage, Resettlement and Stakeholder Engagement (SE) Specialists. As soon as mention of restitution or wake-fees surface, issues surrounding the legal NoK are often contested. A procedure for the handling of such cases must be formulated, in conjunction with the specialists. Such cases should be reported to the CLO to ensure conformity and transparency.	
Stop work	– Should the Contractor fail to remain within the approved construction footprint, or intentionally/negligently cause damage to any burial site, the ECO reserves the right to suspend, or partially suspend, construction by means of an instruction from the Implementing Agent in order to allow for the assessment, reporting and rectification of the impact.	

5.3.11 Social Management Plan (including Vulnerable Groups)

Identified impacts/risks	1. Potential physical displacement as a result of the loss of shelter/homes 2. Economic displacement as a result of the loss of livelihoods or sources of income 3. Economic displacement as a result of the loss of access to natural resources 4. Increased risk of disease transmission 5. Increased risks of work and traffic accidents 6. Interference with the local communities' daily lives 7. Discomfort generated by construction activities, affecting the quality of life of local communities
Identified project benefits	8. Job creation 9. Creation of opportunities for local sourcing of goods and services 10. Increased safety after demining activities 11. Increased availability and reliability of electricity
Objectives of improved management	1. Ensure that all individuals/families, displaced as a result of the project, are resettled in a fair and adequate manner. 2. Ensure that all individuals/families that may lose their livelihoods or have their sources of income disturbed/affected, are compensated in a fair and adequate manner. 3. Ensure that all individuals/families that may lose access to natural resources, are compensated in a fair and adequate manner. 4. Prevent the transmission of diseases to the workers and local communities. 5. Prevent the occurrence of accidents, for both the construction workers and the local communities. 6. Ensure that any disturbance to the local communities' daily lives is kept to a minimum. 7. Ensure that all potential disturbances associated with the construction works are kept to a minimum. 8. Promote the local sourcing of labour for the job opportunities created. 9. Promote and encourage the local sourcing of goods and services, and support the indirect economic growth of local communities. 10. Free and open up the use of areas that were previously restricted, deemed unsafe or had unreliable/insufficient security measures, as a result of the potential presence of land mines. 11. Prevent the potential occurrence of nuisances associated with project activities such as traffic, air emissions, noise, etc.
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS4: Community health, safety and security ESSS7: Community health and safety
	PS2: Labour and working conditions ESSS6: Labour and working conditions
	PS7: Indigenous peoples ESSS4: Indigenous peoples
	ESSS2: Stakeholder engagement and information disclosure ESSS3: Gender mainstreaming
	EHS Guidelines: General EHS Guidelines – Section 3 Community health and safety

	EHS Guidelines: General EHS Guidelines – Section 4 Construction and Decommissioning: 4.3 – Community health and safety EHS Guidelines: EHS Guidelines for Electric Power Transmission and Distribution – Section 1.0 Industry Specific Impacts and Management: 1.3 – Community health and safety
	Law no. 7/04 of 15 October - Framework Law for Social Protection Law no. 7/15 of 15 June - General Labour Law of Angola Decree no. 31/94 of 5 August - Health and Safety Conditions at the Workplace

5.3.11.1 Pre-Construction Measures

Management measure	Detailed Description	Responsibility
Specifications	– The expectations of the local communities, and especially the Vulnerable Groups (VGs) namely the Indigenous People (IP) and women, shall be considered throughout the project lifespan in terms of their involvement, compensation and communication. Refer to the Stakeholder Engagement Plan (SEP), Vulnerable Group Plan (VGP), and Resettlement Policy Framework (RPF) presented in Annexures A, B and C, respectively, to this ESMP. – Before project construction, the appointed Social/Stakeholder Specialist will be oriented to their roles and responsibilities, as well as the understanding of the VGs' social and cultural reality. – The Social Specialist, with the support of the Local and Traditional Authorities, will identify at least one female and one male Community Liaison Officers (CLOs) to ensure the communication and involvement of the VGs. Specific responsibilities of this CLO include (also refer to Section 4.4.3 for responsibilities of the CLO): – Participating in data collection from the community; – Awareness creation in the community about the VGP; – Facilitating meetings with VGs; – Consolidating VGP at the community level; and – Addressing grievances from VGs, including GBV-related grievances. – A demining management plan must be implemented prior to construction activities, and in consultation with the competent authorities. – A Resettlement Action Plan (RAP) shall be developed and implemented prior to the start of any construction activity. A Resettlement Policy Framework (RPF) has been prepared as part of the ESIA documentation to guide the preparation of the RAP, upon confirmation of the detailed design (Annexure C). The RAP will guide the resettlement process to ensure that appropriate compensation is provided to the people/social groups that will be directly affected/displaced. The RAP process must also guide the compensation for loss of livelihoods. Based on the needs of local communities, priority should be given to compensation through the provision of an asset rather than monetary compensation. – Due to lack of water, which is the local populations' main concern (primarily due to the current drought), the construction of water infrastructure (both for supplying the communities and for livestock) can constitute a significant compensation for communities. However, the type of compensation for losses shall be agreed on with the Traditional Authorities and this will ensure Informed Consultation and Participation (ICP) and Free, Prior and Informed Consultation (FPIC) of the affected communities.	Contractor RNT Social Specialist

Management measure	Detailed Description	Responsibility
	– The RAP will be prepared in line with Angola's legal framework and international lenders standards for socially-sustainable development (see Section 5.3.11). The resettlement should be implemented with a high level of involvement of affected people/social groups, the Local and Traditional Authorities and local host communities, to ensure that the process is informed by the social and economic needs, constraints and expectations of all involved. – The following plans and programmes shall be implemented prior to construction commencing: – Water Programme (specifically a proposed borehole) – Local Employment Programme – Local Procurement Programme – Community Education and Awareness Programme – Workers Education and Awareness Programme – Stakeholders Engagement Plan (SEP) – Grievance Mechanism, including for a procedure for GBV-related grievances. – Develop a Local Employment Plan for the construction phase to ensure that local people (both women and men) 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. Quotas for local employment should be set, based on the availability of appropriate local skills, and this information should be sourced from the municipal and communal authorities by undertaking an independent skills audit at the outset. It is recommended that a minimum of 10% local people should be employed, 5% women and 5 % men. The Contractor's contract should specify that these positions may only be filled by persons outside of these categories if it can be demonstrated that no suitable persons are recorded in the skills register to fill these positions, and no other candidates could be identified through local advertising. – All workers should be adequately trained for the proper performance of their functions (see Section 6). The Contractor should work with relevant Local and Traditional Authorities to advertise all openings in ways that are accessible to local communities (included in the SEP). The job creation should be accompanied by protection of the fundamental rights of workers, in accordance with the requirements set out in the General Labour Law of Angola (Law no. 7/15 of 15 June), and with Labour and Work Conditions DBSA and IFC Performance Standards. – Develop a Local Procurement Plan for the construction phase, setting out the purchasing strategy, stipulating how local purchase of goods and services (e.g. transportation, acquisition of construction materials from mining operations located in the region, waste management and disposal, water supply and catering) will be done so as to maximise local sourcing, as well as to promote the use of women-owned businesses. – Ensure the equal and effective participation of women and men in the Procurement Board. – The contractor/s 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 – Accommodation for non-local workers to be in nearby villages/towns, if possible, and not near the site), to reduce disruption to local communities.	

Management measure	Detailed Description	Responsibility
	– Avoid the positioning and placement of construction camps within close proximity to schools or locations where there is a permanent presence of young women and/or female children; – When developing the ESMS, quotas for women in operational managerial positions should be recommended.	
Avoidance	– Adjustments to the detailed design of the project should take into consideration the detailed social survey (to be performed within the RAP scope) of the corridor directly affected by the final alignment, including all access routes, pylon positions and construction camps locations. This survey should inform areas to be avoided in order to minimise impact on livelihood areas. – The social, heritage and ecology specialists that are required to undertake a walkdown of the corridor should be accompanied by representatives of local communities to assist with the identification of natural, cultural and social resources. – Construction camps should be located far away from schools to avoid the potential harassment of girls and young women.	
Mitigation/ Reduction	– Priority must be given to the use of existing access roads/tracks in the servitude of the existing transmission lines, adjacent to which the ANNA transmission line will be built, as well as areas already intervened. In case there is a need to create new access routes, livelihood resources (e.g. crops or forests) should not be bisected so as to avoid fragmentation. The location of all new access routes, pylons and construction camps should be defined in agreement with the Traditional Authority and the people/social groups that use the land. – A Grievance Mechanism as indicated in Section 8, must be implemented.	
Stop work	N/A	

5.3.11.2 Construction and Decommissioning Measures

5.3.11.2.1 Potential physical displacement that may result in the loss of shelter/homes

Management measure	Detailed Description	Responsibility
Specifications	– Ensure that the RAP is fully implemented and that all people that need to be resettled are duly compensated for their loss before the start of any construction activity in the area.	RNT
Avoidance	N/A	
Mitigation/ Reduction	– A Grievance Mechanism, as indicated in Section 8, must be implemented.	
Stop work	N/A	

5.3.11.2.2 Economic displacement that may result in the loss of livelihoods, sources of income or natural resources

Management measure	Detailed Description	Responsibility
Specifications	– Ensure that the RAP is fully implemented and that all people who may experience losses in livelihoods, sources of income or natural resources, are duly compensated before the start of any construction activity in the area.	RNT

Management measure	Detailed Description	Responsibility
Avoidance	– Apply the mitigation measures proposed in the Biodiversity Management Plan (Section 5.3.6), to limit tree and vegetation clearance to only the areas strictly necessary. This recommendation should also be included in the Demining Management plan. – Provide a Grievance Mechanism for the handling of complaints/requests and gathering of information, to consider as to the need for implementation of new measures.	
Mitigation/ Reduction	– Ensure that access for the local population into the areas with natural resources, is maintained, provided that this does not pose any threat or danger to the communities or construction workers (e.g. traffic). – A Grievance Mechanism as indicated in Section 8, must be implemented.	
Stop work	N/A	

5.3.11.2.3 Increased risk of disease transmission

Management measure	Detailed Description	Responsibility
Specifications	– Implement the Community and Occupational Health and Safety Management Plans (see Section 5.3.14 and Section 5.3.15) including the epidemiological control measures to be directly implemented by the Contractor on construction sites, to assist the workers, and thus avoid pressure on the local health units.	Contractor
Avoidance	– Promote awareness activities among workers regarding water-related, hygiene-related and sexually transmitted diseases, especially HIV/ AIDS (see Section 6). – Promote awareness activities among local communities (particularly women and girls) about the health impacts associated with the presence of non-local workers (see Section 6.4). – Avoid the positioning and placement of construction camps within close proximity to schools or locations where there is a permanent presence of young women and/or female children.	
Mitigation/ Reduction	– A Grievance Mechanism as indicated in Section 8, must be implemented	
Stop work	N/A	

5.3.11.2.4 Increased risk of work and traffic accidents

Management measure	Detailed Description	Responsibility
Specifications	– Implement the Traffic Safety Management Plan (see section 5.3.16), enforcing reduced speed limits and adequate signalling to ensure safe traffic conditions and to ensure that there is access control on the construction sites to prevent access by people who are external to the construction activities.	Contractor
Avoidance	– Implement the SEP, with prior and extended communication of the planned activities (and their timeline) and the access routes to be used during the project construction phase, to enable local communities to increase their perception of danger and manage the potential risks. – Promote awareness activities among local communities (particularly children) about the risk of traffic accidents.	

Management measure	Detailed Description	Responsibility
Mitigation/ Reduction	– A Grievance Mechanism as indicated in Section 8, must be implemented.	
Stop work	N/A	

5.3.11.2.5 *Interference with the daily lives of local communities*

Management measure	Detailed Description	Responsibility
Specifications	N/A	Contractor
Avoidance	– Promote awareness activities among workers about the culture, beliefs, habits and lifestyles of local communities, and rules of conduct. The code of conduct should apply to both contractors and RNT staff and should set out the disciplinary and legal implications of certain activities involving local communities. – Promote awareness activities among local communities about the presence of non-local workers. Materials can also be designed so as to be replicated on other future projects.	
Mitigation/ Reduction	– A Grievance Mechanism as indicated in Section 8, must be implemented. – Locate the workers accommodation in nearby villages/towns and not in the areas along the corridor, to avoid interactions between workers and communities. – Provide worker transport by bus between the site and accommodation to minimise traffic, limit workers remaining in the area after hours, and also to ensure women workers do not have to travel after dark for example	
Stop work	N/A	

5.3.11.2.6 *Discomfort generated by construction activities*

Management measure	Detailed Description	Responsibility
Specifications	– Implement the SEP, with prior and extended communication of the planned activities (and timeline) and the access routes to be used during the project construction phase, to enable local communities to adjust their perception and manage the potential discomfort in their daily lives	Contractor
Avoidance	– Apply mitigation measures provided for air quality and noise, to minimise dust, air pollutants and sound emissions (see Sections 5.3.4 and 5.3.5).	
Mitigation/ Reduction	– A Grievance Mechanism as indicated in Section 8, must be implemented.	
Stop work	N/A	

5.3.11.2.7 *Job creation and opportunities for local sourcing of goods and services*

Management measure	Detailed Description	Responsibility

Specifications	– Implement the Local Employment and Procurement Programmes described in Section 5.3.11.1.	Contractor
Avoidance	N/A	
Mitigation/ Reduction	– A Grievance Mechanism as indicated in Section 8, must be implemented. – Provision of women-friendly protective clothing for jobs relating to the project.	
Stop work	N/A	

5.3.11.3 Operational Measures

Management measure	Detailed Description	Responsibility
Specifications	– Develop a Local Procurement Plan for the operational phase, stipulating how the local purchase of goods and services (e.g. for vegetation clearance) will be done to maximise local sourcing. – Ensure the equal and effective participation of women and men in the Procurement Board.	RNT / CLO
Avoidance	– Publish a brochure in the local language for community outreach, with prohibited and dangerous behaviour to be avoided, and with the correct procedures to follow near the transmission lines. Materials can also be designed so as to be replicated on other similar projects. – Place, at each pylon, a sign in a visible place stating "danger of death" in the local language, and with a symbol for the illiterate, so that it may be understood by all. – A code of conduct should be developed and communicated to all RNT employees and subcontractors working in the area that sets out disciplinary and legal implications of certain activities involving local communities, including GBV.	
Mitigation/ Reduction	– Monitor public exposure to electromagnetic fields. – Ensure ongoing awareness campaigns regarding electricity and safety, where communities are found to be interacting with the infrastructure.	
Stop work	N/A	

5.3.12 Landscape Management Plan

Identified impacts/risks	1. Visual impacts associated with construction works 2. Visual impacts on potential receptors travelling on the main road: Lubango-Cahama-Ondjiva, and visiting Bicuar National Park and the Ruacana Falls 3. Visual impacts on rural receptors, including the villages of Cahama and Kapunda Kavilongo, and local communities/settlements
Objectives of improved management	1. Ensure that the visual disturbance associated with the construction activities are confined and kept to a minimum. 2. Ensure that the presence of the transmission line has as few impacts on the local landscape as possible. 3. Ensure that the presence of the transmission line affects the local communities' sense of place as little as possible.

Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities	
	PS8: Cultural heritage ESSS8: Cultural heritage	
	EHS Guidelines: EHS Guidelines for Electric Power Transmission and Distribution – Section 1.0 Industry Specific Impacts and Management: 1.3 – Communal health and safety: Visual amenity	

5.3.12.1 Pre-Construction Measures

Management measure	Detailed Description	Responsibility
Specifications	– For the construction camps, use previously-disturbed areas whenever possible. Do not locate camp sites in areas where it will be necessary to remove trees and shrubs or large areas of well-established vegetation.	Contractor
Avoidance	– Locate construction camps outside of sensitive areas such as public areas and tourist attractions.	
Mitigation/ Reduction	N/A	
Stop work	N/A	

5.3.12.2 Construction and Decommissioning Measures

Management measure	Detailed Description	Responsibility
Specifications	– Only remove individual trees that pose a threat to the infrastructure, and do not eliminate all existing vegetation within the line route/servitude, as set out in Section 5.3.6.2.1.	Contractor
Avoidance	– Vegetation clearance along the construction footprint of the servitude must be minimised by demarcating the work area and restricting vehicular access outside the footprint.	
Mitigation/ Reduction	– Signage should not be obtrusive and should not be visible against the skyline. – The security lighting around the Contractor's camp must be kept as dim as possible. Upwards light spill must be minimised by "blinkers" designed to ensure that light is directed downwards, whilst also preventing side spill. – All areas affected by the construction footprint and no longer in use must be rehabilitated, following the sequence set out in Section 5.3.6.2.1, as soon as the work in that area is finalised.	
Stop work	N/A	

5.3.12.3 Operational Measures

Management measure	Detailed Description	Responsibility
Specifications	N/A	RNT

Management measure	Detailed Description	Responsibility
Avoidance	– Make sure that existing tracks/roads are used for all required maintenance operations.	
Mitigation/ Reduction	– Within the maintenance activities, only remove individual trees that pose a threat to the infrastructure, and do not eliminate all existing vegetation within the line servitude as it limits the visibility of (i.e. screens) the transmission line.	
Stop work	N/A	

5.3.13 Waste Management Plan

Identified impacts/risks	1. Potential contamination of water, soils and other natural resources 2. Potential effect on natural processes, namely on flora, fauna and human health
Objectives of improved management	1. and 2. Ensure that all the waste (hazardous, non-hazardous and biomedical) produced within the project lifecycle is properly handled, stored and disposed of, to ensure that there is no contamination of any natural resource and to prevent any collateral damage to the ecosystem or effects on human health.
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS 3: Resource efficiency and pollution prevention ESSS10: Resource efficiency, pollution prevention and management
	PS6: Biodiversity conservation and sustainable management of living natural resources ESSS9: Biodiversity conservation and sustainable management of living natural resources and resilience
	EHS Guidelines: General EHS Guidelines – Section 1 Environmental: 1.5 Hazardous material management; 1.6 Waste management EHS Guidelines: General EHS Guidelines – Section 2 Occupational health and safety: 2.4 – Chemical hazards; 2.5 – Biological hazards EHS Guidelines: General EHS Guidelines – Section 3 Community health and safety: 3.5 – Transport of hazardous materials EHS Guidelines: General EHS Guidelines – Section 4 Construction and decommissioning: 4.1– Environment: Contaminated land EHS Guidelines: EHS Guidelines for Electric Power Transmission and Distribution – Section 1.0 Industry Specific Impacts and Management: 1.1– Environmental: Hazardous materials EHS Guidelines: EHS Guidelines for Electric Power Transmission and Distribution – Section 1.0 Industry Specific Impacts and Management: 1.2– Occupational health and safety: Exposure to chemicals
	Presidential Decree no. 190/12 of 24 August - Regulation on Waste Management Executive Decree no. 17/13 of 22 January - Waste management of residues resulting from building and demolition activities

5.3.13.1 Pre-Construction Measures

Management measure	Detailed Description	Responsibility
Specifications	– The Contractor shall review and adjust this Waste Management Plan, taking into consideration the planned construction activities and site-specific constraints, including measures to manage the different waste streams in accordance with the waste management hierarchy (avoid, reuse, recycle and reprocess, and disposal). The option of re-use of materials or products for other purposes should be considered prior to considering recycling. – This Waste Management Plan must respect RNT's Policies and procedures as stated above.	Contractor
Avoidance	– Identify the service providers to be used for the disposal of hazardous, biological/healthcare, non-hazardous and recyclable waste (recycling, disposal, transport, etc.)	
Mitigation/ Reduction	N/A	
Stop work	N/A	

5.3.13.2 Construction and Decommissioning Measures

Management measure	Detailed Description	Responsibility
Specifications	– Ensure that all the waste (hazardous and non-hazardous) produced within the construction phase is properly handled, stored and disposed of.	Contractor
Avoidance	– Implement the waste management procedures stated in the Construction Waste Management Plan, and train all staff in the correct handling of all waste streams. – All work areas must have an adequate number of colour-coded/labelled waste bins to handle the hazardous, non-hazardous and food waste. Waste bins must have lids and must be emptied at daily intervals, or as needed. – Assign staff to be responsible for the implementation of the waste management procedure, making sure that all work sites are kept free of waste, and including a litter collection programme, in order to prevent problems with wild animals (e.g. baboons, black-backed jackals, etc.). Routine clean-ups must be arranged during the work shift. – Waste generated on the construction site must be separated into different categories to facilitate their re-use, recycling or disposal. Hazardous and non-hazardous waste streams must be kept separate from each other. – Containers used for the storage of wastes must be in good condition and be maintained, to minimise corrosion and wear. Waste identified as hazardous will need suitable and appropriately identified containers (e.g. tanks, drums etc.) and kept separate from common/non-hazardous waste and stored in weatherproof containers when not in use. – All hazardous waste storage sites must have a concrete/impermeable hardstand and bunding to prevent spillage. – Whenever possible and feasible, reuse inert construction waste (such as excavated subsoil and building rubble) as backfilling. – No solid waste may be burned or buried on site, or disposed of by any other method on site. Solid waste must be disposed via the formal waste management facilities and systems in the region. – All waste must be recovered and safely disposed of and all removals for disposal or recycling must be recorded and the appropriate documentation, such as proof of safe disposal certificates, must be compiled and filed appropriately.	

Management measure	Detailed Description	Responsibility
	– All batteries must be disposed of at a registered municipal landfill site. – All hazardous waste transporters must be appropriately licensed.	
Mitigation/ Reduction	– Conduct regular inspections of waste storage areas to check for problems, littering, overfilling (e.g collection schedule unadjusted), spillages, etc., and address them accordingly. – Ensure that oily wastewater is treated in an oil separator and settling pond before being discharged to the environment. – Ensure that emergency spill kits are present at strategic locations with capable people with the necessary training available to use the kits in case of accidental spillages. Any spill incidents must be cleaned up immediately and in accordance with the emergency procedure stated in the Contingency Plan included in the Hazardous Materials Management Plan (Section 5.3.8).	
Stop work	– Mismanagement of waste that results in a major consequential spill, repeat littering or runoff into adjacent watercourses, may result in the suspension of the activities by means of an instruction from the ECO/Engineer until non-conformances have been rectified to the ECO's satisfaction. – Should a major spill/contamination occur, the ECO reserves the right to request a suspension, or partial suspension, of construction by instruction from the Implementing Agent in order to allow for the assessment, reporting and rectification of the impact. – Depending on the severity of the non-conformance and degree of negligence on the Contractor's part, the ECO will also inform the relevant competent authority to confirm the Contractor's liability to be prosecuted and/or fined.	

5.3.13.3 Operational Measures

Management measure	Detailed Description	Responsibility
Specifications	– Follow RNT's Policies and procedures as stated above.	RNT
Avoidance	– All hazardous wastes should be appropriately separated and stored in designated and identified (signage) areas, with appropriate demarcation and entry restrictions. Where appropriate, hazardous waste should be temporarily stored in contained central areas, surrounded by berms or concrete containment, to restrict the movement of hazardous substances into the terrestrial or aquatic environments in the event of spills or leaks.	
Mitigation/ Reduction	– Conduct regular inspections of waste storage areas to check for problems, littering, overfilling (e.g collection schedule unadjusted), spillages, etc., and address them accordingly. – Ensure that emergency spill kits are present at strategic locations in the substation, with people with training available to use it the kits in the case of accidental spillages. Any spill incidents must be cleaned up immediately.	
Stop work	N/A	

5.3.14 Community Health and Safety Plan

Identified impacts/risks	1. Potential injury, illness or loss of life of community members due to contact with construction equipment or materials. 2. Potential injury, illness or loss of life of community members due to poorly-designed and constructed infrastructure. 3. Potential injury, illness or loss of life of community members due to contact with high-voltage infrastructure. 4. Potential to contract diseases by the community members as a result of contact with construction workers. 5. Potential of nuisance, or risk of contracting diseases by community members, as a result of emissions, hazardous materials, or other vectors associated with construction activities.
Objectives of improved management	1. Promote and retain a safe and healthy environment for community members.
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS4: Community health and safety ESSS7: Community health and safety
	EHS Guidelines: General EHS Guidelines – Section 3 Community health and safety EHS Guidelines for Electric Power Transmission and Distribution – Section 1.3 Community health and safety
	Law no. 7/15 of 15 June - General Labour Law of Angola Decree no. 31/94 of 5 August - Health and Safety Conditions at the Workplace
	SAPP ESMF (2018) Appendix G: Transmission EMP

5.3.14.1 Pre-Construction Measures

Management measure	Detailed Description	Responsibility
Specifications	– The final design of the transmission line route should adhere to regional and/or national air traffic safety regulations and be done in consultation with the regulatory air traffic authority, if necessary. – Structural safety of infrastructure should be ensured through compliance with relevant national and international design standards or codes. – Risk of electrocution (through direct contact with high-voltage electricity) is to be addressed by: • Use of signs, barriers (e.g. locks on doors, use of gates, use of steel posts surrounding transmission towers, where relevant). Signage must be understandable to illiterate community members. • Education/public outreach to prevent public contact with potentially-dangerous equipment, as detailed in Sections 0 and 5.3.16. • Grounding conducting objects (e.g. fences or other metallic structures) installed near powerlines, to prevent risk of shocking.	Contractor

Management measure	Detailed Description	Responsibility
	– A Community Health and Safety Plan should be developed to include *inter alia*, reduced speed limits, adequate signs to ensure safety and traffic conditions, access control of construction sites to prevent access to people from the surroundings etc. It should align with the Traffic Management Plan specified in Section 5.3.16. The Plan should provide for a register whereby health and safety incidents can be recorded, including the causes and any remedial actions. – Community awareness training is required as detailed in Section 6.4. – An Emergency Preparedness and Response Plan should be developed to include procedures to assist staff and emergency response teams during real-life emergency and training exercises (see Section 7).	
Avoidance	N/A	
Mitigation/ Reduce	– A Grievance Mechanism as indicated in Section 8, must be implemented.	
Stop work	N/A	

5.3.14.2 Construction and Decommissioning Measures

Management measure	Detailed Description	Responsibility
Specifications	– The site security services must be carried out in accordance with relevant human rights principles and in a manner that avoids or minimises all potential risks to the affected communities. – Site security services are required, and security management must include the following: • Restrict the number of entry and exit points; • Erect a physical barrier (e.g. a removable fence) to ensure that there is no unauthorized access from outside of the construction area; and • Erect safety and security signage at the access points. – Workforce training must provide for social awareness, as detailed in Section 6.	Contractor
Avoidance	– All measures relating to water (Section 5.3.2.2) and soil (Section 5.3.3.2) pollution, as well as air quality (Section 5.3.4.1) and noise (Section 5.3.5.1) must be adhered to. – The use of local labour during construction will reduce the interactions and health risks from a non-local workforce.	
Mitigation/ Reduction	– A Grievance Mechanism as indicated in Section 8, must be implemented.	
Stop work	N/A	

5.3.14.3 Operational Measures

Management measure	Detailed Description	Responsibility
Specifications	N/A	RNT

Management measure	Detailed Description	Responsibility
Avoidance	N/A	
Mitigation/ Reduce	– A Grievance Mechanism as indicated in Section 8, must be implemented. – Monitor public exposure to electromagnetic fields.	
Stop work	N/A	

5.3.15 Occupational Health and Safety Plan

Identified impacts/risks	1. Potential worker injury, illness or loss of life due to pollutants and noise. 2. Potential worker injury, illness or loss of life due to risk of contracting diseases. 3. Potential worker injury, illness or loss of life due to poorly-designed and constructed infrastructure. 4. Potential worker injury, illness or loss of life due to working with live power lines. 5. Potential worker injury, illness or loss of life due to working at height. 6. Potential worker injury, illness or loss of life due to exposure to chemicals.
Objectives of improved management	1. Promote and retain a safe and healthy work environment for workers.
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS6: Labour and working conditions ESSS6: Labour and working conditions
	EHS Guidelines: General EHS Guidelines – Section 2 Occupational Health and Safety EHS Guidelines for Electric Power Transmission and Distribution – Section 1.2 Occupational Health and Safety
	Law no. 7/15 of 15 June - General Labour Law of Angola Decree no. 31/94 of 5 August - Health and Safety Conditions at the Workplace Decree no. 53/05 of 15 August - - Legal Regime for Work Accidents and Occupational Diseases
	SAPP ESMF (2018): Appendix G: Transmission ESMP

5.3.15.1 Pre-Construction Measures

Management measure	Detailed Description	Responsibility
Specifications	– A detailed Operational Health and Safety Plan must be developed by the Contractor. – Conduct a risk assessment of construction activities to determine the potential risks that may arise. The risk assessment must inform:	Contractor

Management measure	Detailed Description	Responsibility
	• Awareness management; • Management tools; • Inspections of tools; and • Re-assessment of activities and tasks. – Develop a Health Management Plan to address the following: • Provision of assessment, and active screening and treatment, of workers. • Conducting immunisation programs for workers in local communities to improve health and guard against infection. • Collaboration with local authorities to enhance access of workers' families and the community to public health services and to promote immunisation.	
Avoidance	N/A	
Mitigation/ Reduction	– An Emergency Preparedness and Response Plan must be developed to include procedures to assist staff and emergency response teams during real-life emergency and training exercises (see Section 7). – A Grievance Mechanism as indicated in Section 8, must be implemented.	
Stop work	N/A	

5.3.15.2 Construction and Decommissioning Measures

Management measure	Detailed Description	Responsibility
Specifications	– The Contractor will be responsible for placing a Health and Safety Officer on site to maintain a safe work environment for all employees and to ensure that the following conditions are respected: • Promote fair treatment, non-discrimination, and equal opportunity of workers. • Establish, maintain, and improve the worker-management relationship. • Promote compliance with national employment and labour laws. • Protect workers, including vulnerable groups such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain. • Promote safe and healthy working conditions, and the health of workers. • The use of child labour or forced labour is absolutely forbidden. – The officer will also ensure that all the health and safety-related polices and regulations (i.e. labour laws) are adhered to, regularly reviewed and communicated to workers. – OHS orientation training must be provided to all new employees to ensure that they are made aware of the basic site rules of work on site and of personal protection and prevention of injury to fellow employees. Training should consist of basic hazard awareness, site-specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. Any site-specific hazard or colour-coding in use should be thoroughly reviewed as part of orientation training. – Any health and safety incidents must be reported to the Project Manager immediately. A record of health and safety incidents must be kept on site.	Contractor

Management measure	Detailed Description	Responsibility
	– First aid facilities must be available on site at all times, as well as an adequate number of employees who are trained to carry out first aid procedures, as per Section 6.3. – Only trained and certified workers will be allowed to install electrical equipment, as required in Section 6.3.. Working at height Prevention and control measures for working at height include: – Testing structures for integrity, prior to undertaking work. – Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures, inspection, maintenance, and replacement of fall protection equipment, and the rescue of fall-arrested workers, among others. – Establishment of criteria for use of 100 percent fall protection (typically when working over 2 m above the working surface, but in certain cases extended to 7 m, depending on the activity). The fall protection system should be appropriate for the tower structure and associated necessary movements, including ascent, descent, and moving from point-to-point. – Installation of fixtures on tower components to facilitate the use of fall protection systems. – Provision of an adequate work-positioning device system for workers. Connectors on positioning systems should be compatible with the tower components to which they are attached. – Hoisting equipment should be properly rated and maintained, and hoist operators properly trained. – Safety belts should be of not less than 16 mm (5/8 inch) two-in-one nylon, or a material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibres become evident. – When operating power tools at height, workers should use a second (back-up) safety strap. – Signs, and other obstructions, should be removed from poles or structures, prior to undertaking work. – An approved tool bag should be used for raising or lowering tools or materials to workers on structures. Working with live powerlines: Prevention and control measures associated with live powerlines include: – Only allow trained and certified workers to install, maintain, or repair electrical equipment, as required in Section 6.3. – Isolate and properly ground live power distribution lines before work is performed on, or in close proximity to, the lines. – Ensure that live-wire work is conducted by trained workers, with strict adherence to specific safety and insulation standards. Qualified or trained employees working on transmission or distribution systems, should be able to achieve the following: • Distinguish live parts from other parts of the electrical system; • Determine the voltage of live parts; • Understand the minimum approach distances outlined for specific live line voltages; and • Ensure proper use of special safety equipment and procedures when working near, or on, exposed energised parts of an electrical system. – Workers should not approach an exposed energised or conductive part, even if properly trained, unless: • The worker is properly insulated from the energised part with gloves or other approved insulation; • The energised part is properly insulated from the worker and any other conductive object; or,	

Management measure	Detailed Description	Responsibility
	• The worker is properly isolated and insulated from any other conductive object (live-line work). – Workers not directly associated with power transmission and distribution activities, who are operating around powerlines or power substations, should adhere to local legislation, standards, and guidelines relating to minimum approach distances for excavations, tools, vehicles, pruning, and other activities. – Minimum hot stick distances may only be reduced provided that the distance remaining is greater than the distance between the energised part and a grounded surface.	
Avoidance	– Personal protective equipment (PPE) must be worn by all employees and contractors when on site. – Employees and contractors must receive proper training before receiving their PPE.	
Mitigation/ Reduction	– Appropriate traffic safety must be in place and must be included in inductions, refer to the Plan (Section 5.3.16) and Inductions (Section 6.3.). – All measures relating to water (Section 5.3.2.2) and soil (Section 5.3.3.2) pollution, as well as air quality (Section 5.3.4.1) and noise (Section 5.3.5.1), must be adhered to.	
Stop work	N/A	

5.3.15.3 Operational Measures

Management measure	Detailed Description	Responsibility
Specifications	– Conduct a risk assessment of operational activities to determine potential risks that may arise. – Prevention and control measures associated with live powerlines, stated in Section 5.3.14., must be followed. Where maintenance and operation is required within minimum setback distances, specific training, safety measures, personal safety devices, and other precautions should be defined in a health and safety plan. – Prevention and control measures for working at height, as stated in Section 5.3.14, must be followed. – Occupational Electromagnetic Field (EMF) exposure should be prevented, or minimised, through the preparation and implementation of an EMF safety program, including the following components: • Identification of potential exposure levels in the workplace, including surveys of exposure levels in new projects and the use of personal monitors during working activities. • Training of workers in the identification of occupational EMF levels and hazards. • Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, limiting access to properly-trained workers. • Implementation of action plans to address potential or confirmed exposure levels that exceed referenced occupational exposure levels developed by international organisations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and the Institute of Electrical and Electronics Engineers (IEEE). • Personal exposure monitoring equipment should be set to warn of exposure levels that are below occupational exposure reference levels (e.g. 50 percent). Action plans to address occupational exposure may include limiting exposure time through work rotation, increasing the distance between the source and the worker, when feasible, or the use of shielding materials.	RNT

Management measure	Detailed Description	Responsibility
Avoidance	N/A	
Mitigation/ Reduce	N/A	
Stop work	N/A	

5.3.16 Traffic Safety Management Plan

Identified impacts/risks	1. Potential worker or community injury or loss of life due to traffic accidents
Objectives of improved management	1. Prevent and reduce traffic accidents and injuries.
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS6: Labour and working conditions ESSS6: Labour and working conditions
	EHS Guidelines: General EHS Guidelines – Section 3.4 Traffic safety
	Law no. 7/15 of 15 June - General Labour Law of Angola Decree no. 31/94 of 5 August - Health and Safety Conditions at the Workplace Decree no. 53/05 of 15 August - - Legal Regime for Work Accidents and Occupational Diseases
	SAPP ESMF (2018): Appendix G: Transmission ESMP

5.3.16.1 Pre-Construction Measures

Management measure	Detailed Description	Responsibility
Specifications	– Compile and implement a site-specific Traffic Safety Management Plan for the construction phase to address all impacts from increases in traffic, including measures herein.	Contractor
Avoidance	– Collaborate with local communities and responsible authorities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may be present. – Collaborate with local communities on education about traffic and pedestrian safety (e.g. school education campaigns), as stated in Section 6.4.	

Mitigation/ Reduction	– Use locally-sourced materials, whenever possible, to minimise transport distances. – Provide bus transport for workers to minimise external traffic, where necessary.	
Stop work	N/A	

5.3.16.2 Construction and Decommissioning Measures

Management measure	Detailed Description	Responsibility
Specifications	– Provide training in traffic safety management (Section 6.3.1) to all workers. They should also have the necessary qualifications or licenses to operate the vehicles, equipment and eventual attachments. – Training in incident reporting is required (Section 6.3.1). – Establish traffic control measures (both on site and on access roads to the site), including road signs and flag persons to warn of dangerous conditions. – Adopt best transport safety practices, including: • Improve driving skills and require drivers to be licenced • Enforce speed limits on site • Set limits for trip duration and arrange driver rosters to avoid overtiredness • Avoid dangerous routes and times of day, to reduce the risk of accidents • Use speed control devices (governers) on trucks, and remote monitoring of driver actions • Maintain vehicles regularly and use manufacturer-approved parts to avoid equipment malfunction or premature failure. – Relevant permits from the Roads Authority must be sought, and drivers must adhere to the regulated road rules. – Minimise pedestrian interaction with construction vehicles by controlling pedestrian passage in construction areas.	Contractor
Avoidance	– Access to construction vehicles should be managed, with the driver signing for the vehicle in use. – All vehicles accessing the site should adhere to a low speed limit. – Avoid off-road driving and unnecessary night-time driving in the area. – Inspect and maintain access roads where applicable.	
Mitigation/ Reduction	– Co-ordinate with emergency responders to ensure that appropriate first aid is provided in the event of accidents.	
Stop work	N/A	

5.3.17 Resource Efficiency Management Plan

Identified impacts/risks	1. Wasteful use of energy 2. Wasteful use of water 3. Wasteful use of materials

Objectives of improved management	1. Use resources efficiently
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities
	PS 3: Resource efficiency and pollution prevention ESSS10: Resource efficiency, pollution prevention and management

5.3.17.1 Pre-Construction Measures

Management measure	Detailed Description	Responsibility
Specifications	– The Integrated Water Resource Management Plan specified in Section 5.3.2 should also provide for effective provision of fresh water for all on-site processes, operations, facilities and services for staff, contractors and sub-contractors, based on most accurate estimates of such requirements. The Plan must demonstrate how water will be reused, recycled or treated where possible. – Contract documentation to include fines for excessive or wasteful water usage. – Where lighting is required, energy saving lighting must be used. – Fuel-efficient vehicles must be used. – SEP engagements should identify any conflicting water use demands and the community's dependency on water resources and conservation requirements within the area. – Construction materials are to be sourced locally, or at least regionally, as far as possible.	.Contractor
Avoidance	– Avoid wasteful use of materials and double-handling.	
Mitigation/ Reduction	– Manage and reduce the use of water, fuel and energy as far as possible.	
Stop work	N/A	

5.3.17.2 Construction and Decommissioning Measures

Management measure	Detailed Description	Responsibility
Specifications	– Contractor training must provide for water and energy awareness training, as included in Section 6.	Contractor
Avoidance	– Use ready-mixed concrete instead of mixing on site, where possible. – Site buildings to make provision for rainwater harvesting if works occur during wet season. – Water for dust suppression-purposes must come from recycling/recirculating, as set out in Section 5.3.4.	

Management measure	Detailed Description	Responsibility
	– Equipment not in use will be switched off and unplugged to save on unnecessary energy costs.	
Mitigation/ Reduction	– Fit all hoses on site with a ‘squirt’ or ‘squeeze’ nozzle to minimise water use. – Flush toilets should not to be used at the construction camp. – Contractors to issue workers with refillable bottles for daily use, rather than drinking directly from a tap or hose. – Minimal lighting should be used at night, taking cognisance of any health and safety requirements. – Block-cutting or angle-grinding to be accompanied by water poured from a bucket and not a hose. – All workers to wash their tools/equipment (after daily activities) at a dedicated bucket/facility on the site, instead of under running water. Washwater is to be reduced.	
Stop work	N/A	

5.3.17.3 Operational Measures

Management measure	Detailed Description	Responsibility
Specifications	– Institutional training, as set out in Section 6.2.1, should include awareness of energy and water conservation behaviours of staff.	RNT
Avoidance	– Equipment not in use must be switched off and unplugged to save on unnecessary energy costs.	
Mitigation/ Reduction	– Manage and reduce the use of water, fuel and energy as much as possible	
Stop work	N/A	

5.3.18 Decommissioning Management Plan

Identified impacts/risks	1.Abandoned infrastructure poses a health and safety risk to the public. 2. Ongoing environmental impacts after operation ceases e.g. erosion
Objectives of improved management	1. Safe and efficient removal of all transmission line infrastructure components. 2. Rehabilitation of the project footprint to conditions as close to pre-construction characteristics as possible, including restoration of indigenous vegetation, habitat and/or land use.
Applicable Standards and legislation	PS 1: Assessment and management of environmental and social risks and impacts ESSS1: Project screening: environmental and social risks, impacts and opportunities

5.3.18.1 Pre-Construction Measures

Management measure	Detailed Description	Responsibility
Specifications	– A detailed decommissioning plan should be developed, and should consider, at the least, the requirements for decommissioning stated below. This plan should be based on current site conditions and should involve specialists able to provide inputs into potential ecological/biodiversity resources and appropriate and specific rehabilitation techniques. – Before decommissioning commences, the SEP should be revised and provide for consultations with the surrounding communities, the Local and Traditional Authorities. – The Grievance Mechanism should remain available for stakeholders to lodge any grievances.	RNT
	– Local Labour and Procurement Plans should be developed that comply with RNT's policies and requirements of the funders. – Environmental legislation relevant at that point in time should be adhered to, and the necessary permits or licences shall be obtained.	Decommissioning Contractor
Avoidance	N/A	
Mitigation/ Reduction	N/A	
Stop work	N/A	

5.3.18.2 Decommissioning Measures

Management measure	Detailed Description	Responsibility
Specifications	– Dismantling and removal of all infrastructure. – Identify options for re-use, recycling or disposal of infrastructure, in accordance with NamPower's waste minimisation and disposal practices and relevant legislation at the time. – Restore servitude to surrounding land use as far as practical. – Restore rights to the communities adjacent to the servitude. – Removal of foundations and rehabilitation of access roads will include work to alleviate soil compaction, shaping of the ground to natural contours, replacing topsoil and rehabilitating with indigenous vegetation.	Decommissioning Contractor
Avoidance	N/A	
Mitigation/ Reduction	– Limit temporary disturbance footprint. – Temporary and permanently disturbed areas to be rehabilitated with indigenous vegetation. – Work in watercourses and wetland areas should be limited and, where possible, manual labour should be used as a preference. – Measures to limit water pollution (Section 5.3.2), soil erosion (Section 5.3.3), dust and emissions (Section 5.3.4.1), noise (Section 5.3.5.1), biodiversity (Section 5.3.6), alien vegetation (Section 5.3.7), hazardous materials (Section 5.3.8), social (Section 5.3.11), waste (Section 5.3.13), community health and safety (Section 5.3.14), occupational health and safety (Section 5.3.15), traffic (Section 5.3.16) and resource efficiency (Section 5.3.17) impacts, are included in the above sections and are applicable where relevant.	
Stop work	N/A	

5.4 Environmental and social monitoring plans

5.4.1 Pre-construction phase

Parameters	Sampling		Indicator	Target	Responsibility	Estimated Cost
	Location and requirements (if applicable)	Method and Frequency				
Climate change						
GHG management plan	N/A	Pre-construction and monitored during construction and operation	GHG emissions during project lifecycle (tonnes CO2 equiv. emissions saved, captured or displaced p.a.)	Target established prior to construction Minimum GHG emissions	RNT	Refer to costing table (Table 9.1)
Water resources						
Baseline groundwater levels	Water levels of nearby boreholes	Measure groundwater level in nearby borehole	Groundwater levels	N/A as it is for baseline purposes	EO	Included in Contractors' obligations
Social						
Resettlement Action Plan	PACs	Pre-construction	Detailed RAP prepared and identified indicators / targets are monitored (refer RPF)	RAP implemented prior to construction No grievances with regards to RAP	RNT's CLO; RAP specialist	Refer to costing table (Table 9.1)
Local Employment Programme	N/A	Pre-construction and monitored during construction and operation; Construction – twice a year; Operation -annually	Direct operational jobs (number of women, youth and indigenous people) Number of training opportunities provided (number of women, youth and indigenous people)	Programme established prior to construction Maximum women, youth and indigenous people employment (minimum of 10% local people, 5% women and 5% male) Maximum training opportunities created	Contractor RNT's CLO	Included in Contractor's obligations

Parameters	Sampling		Indicator	Target	Responsibility	Estimated Cost
	Location and requirements (if applicable)	Method and Frequency				
Local Procurement Programme	N/A	Pre-construction and monitored during construction and operation	Number of local service providers	Programme established prior to construction as part of the update of tis ESMP Maximum local service providers and promote women's businesses within the supply chain	Contractor RNT's CLO	Included in Contractor's obligations
Community health and safety						
Emergency Preparedness and Response Plan	N/A	Pre-construction and monitored during construction	Detailed Emergency Preparedness and Response Plan prepared and identified indicators / targets are monitored	Plan established prior to construction as part of the update of tis ESMP	Contractor	Included in Contractor's obligations
Occupational health and safety						
OHS Plan	N/A	Pre-construction and monitored during construction	Detailed OHS plan prepared and identified indicators / targets are monitored	Plan established prior to construction as part of the update of tis ESMP	Contractor	Included in Contractor's obligations
Health Management Plan	N/A	Pre-construction and monitored during construction	Health Management Plan prepared and identified indicators / targets are monitored	Plan established prior to construction as part of the update of tis ESMP	Contractor	Included in Contractor's obligations
Traffic safety						
Traffic Management Plan	N/A	Pre-construction and monitored during construction	Traffic Management Plan prepared and identified indicators / targets are monitored	Plan established prior to construction as part of the update of tis ESMP	Contractor	Included in Contractor's obligations
Sourcing of materials	On site	Procurement documentation; Pre-construction	% of materials sourced locally or within the region	All materials sourced locally or within the region	Contractor	Included in Contractor's obligations

Parameters	Sampling		Indicator	Target	Responsibility	Estimated Cost
	Location and requirements (if applicable)	Method and Frequency				
Resource efficiency						
Integrated Water Use Management Plan	N/A	Pre-construction and monitored during construction	Integrated Water Use Management Plan prepared and identified indicators / targets are monitored	Plan established prior to construction as part of the update of tis ESMP	Contractor	Included in Contractor's obligations

5.4.2 Construction and decommissioning phases

Parameters	Sampling		Indicator	Target	Responsibility	Estimated Cost
	Location and requirements (if applicable)	Method and Frequency				
Climate change						
Heat waves	All areas to be affected by construction works	Visual inspection: daily	Provision of water to staff; Training on heat stress; Inclusion frequent breaks in construction schedules; Protective clothing	All staff have water during all day All staff to have induction on what to do in case of a heat wave Evidence of breaks taken All staff with adequate clothing for weather conditions	Contractor	Included in Contractor's obligations

Parameters	Sampling: Location and requirements (if applicable)	Sampling: Method and Frequency	Indicator	Target	Responsibility	Estimated Cost
Water resources						
Water quality of perennial watercourses or ephemeral watercourses (if containing water – e.g. after a storm or during the rainy season)	Construction works close to: Caculuvar and Cunene rivers, Ephemeral watercourses with flow (when crossing and/or within a 100 m radius of the watercourse)	Visual inspection: daily (during works near any watercourse with flow)	Turbidity and sedimentation	No visible abnormal water turbidity or sedimentation close to works	EO	Included in Contractors' obligations
		Water sampling: monthly (only during works near the Caculuvar and Cunene rivers; and Ephemeral watercourses with flow)	IFC and Angola water quality parameters (whichever is the more stringent)	pH - 6-9 DO - at least 75%saturation BOD5 (20°C) - 30 mg/l COD - 75 mg/l TSS - 25 mg/l Free & Saline Ammonia - 10 mg/l as N Oils and greases -2,5 mg/l (gravimetric method) Total Coliform – 400 MPN/100ml	EO	When working in proximity to the Caculuvar and Cunene rivers; and crossing of ephemeral watercourses with flow Refer to costing table (Table 9.1)
Quality of effluent (including stormwater) discharged to the	Active construction fronts	Visual inspection: daily	Contaminated water	No evidence of contaminated water being discharges	EO	Included in Contractors' obligations

Parameters	Sampling		Indicator	Target	Responsibility	Estimated Cost
	Location and requirements (if applicable)	Method and Frequency				
environment, or reused for dust suppression	Active construction fronts; if any contamination is detected upon visual inspection	Water sampling: if required	IFC and Angolan water quality parameters (whichever is the more stringent)	pH - 6-9 DO - at least 75%saturation BOD5 (20°C) - 30 mg/l COD - 75 mg/l TSS - 25 mg/l Free & Saline Ammonia - 10 mg/l as N Oils and greases -2,5 mg/l (gravimetric method) Total Coliform – 400 MPN/100ml	EO /ECO	*Ad hoc* sampling if required Refer to costing table (Table 9.1)
Quantity of effluent (including stormwater) discharged to the environment	Active construction fronts	Visual inspection: daily	Volume of water discharged	No evidence of large volumes of water discharged No evidence of effluent discharged	EO	Included in Contractors' obligations
Groundwater levels	Water levels of construction borehole/s	Measure water level in borehole: weekly	Groundwater levels Groundwater use	No abnormal/ unexplained depletion of water levels	EO	Included in Contractors' obligations
	Water levels of nearby boreholes	Measure water level in nearby borehole: every second week	Groundwater levels	No abnormal/ unexplained depletion of water levels	EO /ECO	Included in Contractors' obligations
Erosion of watercourses	Active construction fronts and accesses	Visual inspection: daily	Erosion	No evidence of erosion	EO	Included in Contractors' obligations
Contamination of watercourses	Active construction fronts	Visual inspection: daily	Contamination of water sources	No evidence of contamination	EO	Included in Contractors' obligations

Parameters	Sampling: Location and requirements (if applicable)	Sampling: Method and Frequency	Indicator	Target	Responsibility	Estimated Cost
Soils and land use						
Removal of topsoil	All areas affected by construction activities, e.g. construction camps, access roads, pylon and substation implantation areas	Visual inspection: daily	Depth of topsoil removed Contamination of topsoil	Topsoil is removed to a maximum depth of 30 cm No contamination of topsoil by other materials	EO	Included in Contractors' obligations
Storage of topsoil	All topsoil stockpiles	Visual inspection: weekly, from beginning of construction until finalization of rehabilitation	Quality of topsoil in stockpiles Disturbance of topsoil stockpiles	No evidence of compaction of topsoil. No evidence of topsoil stockpile being eroded by wind or water No evidence of weeds and alien invasive species No evidence of handling of topsoil (other than initial removal and final reapplication)	EO	Included in Contractors' obligations
Topsoil application	All topsoil stockpiles	Visual inspection upon application of topsoil in the areas under rehabilitation	Quality of topsoil used for rehabilitation	Topsoil applied during rehabilitation matches the quality and thickness of topsoil removed during site clearance	EO	Included in Contractors' obligations
Soil contamination	Active construction fronts	Visual inspection: daily	Contaminated soil	No evidence of soil contamination	EO	Included in Contractors' obligations

Parameters	Sampling		Indicator	Target	Responsibility	Estimated Cost
	Location and requirements (if applicable)	**Method and Frequency**				
Air Quality						
Air emissions, especially dust	Active construction fronts and accesses	Visual inspection: weekly	Number of air quality related complaints Dust deposits	No air quality related complaints No evidence of excessive dust on vegetation or on community assets (e.g. houses, crops etc)	EO	Included in Contractors' obligations
	Location relating to a persistent complaint even after implementation of dust suppression mitigation measures	Dust sampling: if and when required	WHO guidelines for particulate matter	No exceedances: PM_{10} (24hour) – 50 μg/m^3 $PM_{2.5}$ (24hour) – 25 μg/m^3	EO/ECO	*Ad hoc* sampling if required Refer to costing table (Table 9.1)
Noise						
Noise nuisance	Active construction fronts and accesses	Noise inspection: weekly	Number of noise complaints Excessive noise	No noise related complaints No evidence of excessive noise	EO	Included in Contractors' obligations

Parameters	Sampling: Location and requirements (if applicable)	Sampling: Method and Frequency	Indicator	Target	Responsibility	Estimated Cost
	Location relating to a persistent complaint even after implementation of mitigation measures	Noise emission sampling: if and when required	WHO Guidelines on noise	No exceedances of the below or maximum increase in background levels of 3 dB at the nearest receptor location off-site: Daytime (07:00 - 22:00) One Hour L_{Aeq} • Residential; institutional; educational[1]: 55 dBA • Industrial; commercial: 70 dBA	EO/ECO	*Ad hoc* sampling if required Refer to costing table (Table 9.1)
Biodiversity						
Vegetation and habitats	All areas to be affected by construction works	Visual inspection: before construction starts in an area	Avoidance of sensitive areas Avoidance of unnecessary vegetation removal or damage	All work areas demarcated All sensitive areas identified by ecologist demarcated as no-go areas No evidence of disturbance outside construction footprint No evidence of unnecessary vegetation removal or damage	EO	Included in Contractors' obligations
		Specialist inspection: quarterly			Ecology specialist	Refer to costing table (Table 9.1)
	Active construction fronts and accesses and	Visual inspection: weekly	Quality of surrounding vegetation: species composition	No evidence of impacts to quality of	EO	Included in Contractors' obligations

[1] Guidelines values are for noise levels measured out of doors. Source: Guidelines for Community Noise, World Health Organization (WHO), 1999.

Parameters	Sampling		Indicator	Target	Responsibility	Estimated Cost
	Location and requirements (if applicable)	Method and Frequency				
	surrounding areas of potential impact	Specialist inspection: quarterly	vegetation density vegetation structure plant health	surrounding vegetation	Ecology specialist	Refer to costing table (Table 9.1)
	Where project crosses perennial (Caculuvar and Cunene rivers) and ephemeral watercourses (Figure 11.1)	Visual inspection: weekly	Quality of riparian vegetation	No evidence of impacts to riparian vegetation outside active work areas All impacted areas rehabilitated after completion of works	EO	Included in Contractors' obligations
		Specialist inspection: quarterly			Ecology specialist	Refer to costing table (Table 9.1)
	Areas affected by construction works no longer in use	Visual inspection: weekly	Duration between completion of works and rehabilitation	Immediate rehabilitation of inactive work areas	EO	Included in Contractors' obligations
		Specialist inspection: quarterly	Indigenous plant species used Presence of alien invasive plant species	No evidence of non-indigenous species used for rehabilitation No evidence of alien invasive vegetation plant species	Ecology specialist	Refer to costing table (Table 9.1)
Fauna (including avifauna)	All areas to be affected by construction works	Visual inspection: before construction starts in an area	Unnecessary tree felling (especially trees with nests; known perching sites – e.g. large and/or dead trees)	No evidence of unnecessary tree felling	EO	Included in Contractors' obligations
		Specialist inspection: quarterly			Ecology specialist	Refer to costing table (Table 9.1)
	Active construction fronts and accesses	Visual inspection: daily	Presence of fauna in work areas	No fauna trapped or killed in active work areas	EO	Included in Contractors' obligations
		Visual inspection: weekly	Damage to surrounding vegetation	No evidence of disturbance outside construction footprint	EO	Included in Contractors' obligations

Parameters	Sampling: Location and requirements (if applicable)	Sampling: Method and Frequency	Indicator	Target	Responsibility	Estimated Cost
		Specialist inspection: quarterly	Driving at night Fauna mortalities Litter	No evidence of driving outside of official access roads No evidence of driving at night No evidence of fauna mortalities, especially reptiles No evidence of litter	Ecology specialist	Refer to costing table (Table 9.1)
Ecosystem services	All construction areas	As needed	Illegal capture or use of species	No evidence of illegal capture, use, or collection of fauna and flora species	EO	Included in Contractors' obligations
Alien invasive plant species						
Alien invasive plant species	All construction areas	Visual inspection: daily	Presence of invasive alien plant species	No evidence of alien invasive plant species	EO	Included in Contractors' obligations
		Specialist inspection: quarterly			Ecology specialist	Refer to costing table (Table 9.1)
Hazardous materials						
Management of hazardous materials	All construction areas, storage and disposal areas	Visual inspection: daily Detailed inspection: weekly	Storage of the hazardous materials Functioning of oil separators and retention ponds	All hazardous materials in clearly marked sealable containers in bunded areas Oil separators and retention ponds functioning correctly	EO/ECO	Included in Contractors' obligations

Parameters	Sampling: Location and requirements (if applicable)	Sampling: Method and Frequency	Indicator	Target	Responsibility	Estimated Cost
		Inspection of records: monthly	Record keeping of of all hazardous substances stored on site, their location, date of reception, use, on site disposal, transport and final disposal/treatment Frequent inspection of containers Requisite vehicle and drivers licences Number of incidents, contingency plans and appropriate disposal of hazardous material	All hazardous substances stored on site to have records pertaining to their location, date of reception, use, on site disposal, transport and final disposal/treatment All containers to be regularly inspected All drivers and vehicles to hold requisite licence No contamination of water or soil, no spills All incidents to follow respective contingency plan All hazardous waste disposed of (including spills) to be recorded	EO/ECO	Included in Contractors' obligations
Cement / concrete batching	Active construction fronts	Visual inspection: daily Detailed inspection: weekly	Occurrence of spills or contamination events Record keeping of incidents, contingency plans and concrete waste disposal	No contamination of water or soil, no spills All incidents to follow respective contingency plan All concrete waste disposed of (including spills) to be recorded	EO/ECO	Included in Contractors' obligations
Heritage						
Management of heritage sites	All areas to be affected by	Visual inspection: daily	Protection of all heritage sites	All identified heritage sites are clearly	EO	Included in Contractors' obligations

Parameters	Sampling		Indicator	Target	Responsibility	Estimated Cost
	Location and requirements (if applicable)	Method and Frequency				
	construction works and accesses	Specialist inspection: quarterly		marked as no-go areas No evidence of disturbance or damage to ceremonial sites, paleontological or archaeological sites	Heritage specialist	Refer to costing table (Table 9.1)
		Specialist inspection: if and when required	Chance Find Procedure	Chance Find Procedure (and subsequent specialist recommendations) adhered to if artefacts/fossils are found	Heritage specialist	*Ad hoc* inspection if required Refer to costing table (Table 9.1)
Grave relocation						
Management of graves and burial sites	All areas to be affected by construction works and accesses	Visual inspection: daily	Protection of burial sites	All identified burial sites are identified as no-go areas	EO	Included in Contractors' obligations
		Specialist inspection: quarterly		No evidence of damage to burial sites	Heritage specialist	Refer to costing table (Table 9.1)
Landscape						
Visual disturbances	All areas to be affected by construction works and accesses	Visual inspection: before construction starts in an area	Avoidance of unnecessary vegetation removal or damage	No evidence of unnecessary vegetation removal or damage All work areas demarcated	EO	Included in Contractors' obligations

Parameters	Sampling		Indicator	Target	Responsibility	Estimated Cost
	Location and requirements (if applicable)	**Method and Frequency**				
	Active construction fronts and accesses	Visual inspection: daily Detailed inspection: weekly	Avoidance of unnecessary vegetation removal or damage Design of security lighting Dust deposits	No evidence of disturbance outside construction footprint All security lighting around the camp is dimmed/attenuated No evidence of excessive dust on vegetation	EO	Included in Contractors' obligations
	Areas affected by construction works no longer in use	Visual inspection: weekly	Duration until rehabilitation Indigenous plant species used Presence of alien invasive plant species	Areas no longer in use are immediately rehabilitated. Vegetation in rehabilitated areas is only composed by native species No alien invasive vegetation present	EO	Included in Contractors' obligations

Parameters	Sampling		Indicator	Target	Responsibility	Estimated Cost
	Location and requirements (if applicable)	Method and Frequency				
Waste						
All the waste (hazardous, non-hazardous and biomedical) is properly handled, stored and disposed of	All construction areas, storage and disposal areas	Visual inspection: daily Detailed inspection: weekly	Categories of waste stored separately Implementation of waste management hierarchy (avoid, reuse, recycle and reprocess and disposal) Marking of different waste streams Storage of hazardous waste in clearly marked, sealable containers in bunded areas Litter Regular inspection of waste disposal areas to check for spills or leakages	All waste is duly stored and segregated into different categories Proof of implementation of waste management hierarchy (avoid, reuse, recycle and reprocess and disposal) All hazardous and non-hazardous waste streams are separate and clearly marked All hazardous waste stored in clearly marked, sealable containers in bunded areas No litter is present No evidence of spills or leakages	EO	Included in Contractors' obligations

ANNA
TRANSMISSION PROJECT

Parameters	Sampling: Location and requirements (if applicable)	Sampling: Method and Frequency	Indicator	Target	Responsibility	Estimated Cost
		Inspection of records: monthly	Record keeping (and proof) of all waste streams (hazardous, non-hazardous and biomedical) stored on site, their location, date of reception, use, on site disposal, transport and final disposal/treatment Frequent inspection of containers Requisite vehicle and drivers licences Number of incidents, contingency plans and appropriate disposal of all waste streams	All waste stored on site to have records pertaining to their location, date of reception, use, on site disposal, transport and final disposal/treatment All containers to be regularly inspected All drivers and vehicles to hold requisite licence No contamination of water or soil, no spills All incidents to follow respective contingency plan	EO	Included in Contractors' obligations
Community health and safety						
Workforce training	N/A	Training records; prior to operation	Training undertaken as per content included in Section 6 Number of non-conformances that relate to topics covered under the training	All staff to have induction in environmental and social awareness and health and safety as per content included in Section 6 No non-conformances relating to topics covered under the training	EO	Included in Contractor's obligations
Security	At site	Continual watching brief	Security services present	No evidence of security services being absent	EO	Included in Contractor's obligations

Parameters	Sampling		Indicator	Target	Responsibility	Estimated Cost
	Location and requirements (if applicable)	Method and Frequency				
Occupational health and safety						
PPE	On site	Continual watching brief	Personnel wearing appropriate PPE	No evidence of PPE being absent	EO	Included in Contractor's obligations
First aid	On site	Visible inspection and training records; monthly	First aid facilities present on site	No evidence of first aid facilities being absent	EO	Included in Contractor's obligations
Health and safety incidents	On site	Records; monthly	Number of health and safety incidents Records of incidents in register	No health and safety incidents All health and safety incidents recorded in the register	EO	Included in Contractor's obligations
Working with live powerlines	On site	Continual watching brief	Requirements in Section 5.3.15 met (as per EHS Guidelines)	No health and safety incidents All health and safety incidents recorded in the register	EO	Included in Contractor's obligations
Working at height	On site	Continual watching brief	Requirements in Section 5.3.15 met (as per EHS Guidelines)	No health and safety incidents All health and safety incidents recorded in the register	EO	Included in Contractor's obligations
Traffic safety						
Transport of workers	N/A	Records; monthly	% of workers provided with shared transport	All workers provided with shared transport	EO	Included in Contractor's obligations

Parameters	Sampling		Indicator	Target	Responsibility	Estimated Cost
	Location and requirements (if applicable)	Method and Frequency				
Traffic safety and control	On site and areas where interactions with communities are likely	Vehicle accident records; Pedestrian accident records; Near misses; Compliance with speed limits; Training records; Continual watching brief	Traffic control measures present Number of traffic related incidents Number of vehicles exceeding speed limit Traffic safety included in training	No evidence of absent traffic control measures No evidence of traffic related incidents No evidence of vehicles speeding No non-conformances relating to traffic safety covered under the training	EO	Included in contractor's obligations
Resource efficiency						
Water use	On site	Water use records; Monthly	Volume of water used per source, % of water recycled or reused	Unable to set target at this design stage, ECO to report on whether adequate efforts are being implemented to reduce water use and maximise recycling and re-use	EO	Included in contractor's obligations
Energy use	On site	Energy use records; Monthly Behaviours; Continual watching brief	Amount of energy used per source (e.g. petrol, diesel, Acetylene, electricity) Zero equipment on when not in use	As above	EO	Included in Contractor's obligations

5.4.3 Operational phase

Parameters	Sampling: Location and requirements (if applicable)	Sampling: Method and Frequency	Indicator	Target	Responsibility	Estimated Cost
Water resources / Soil / Heritage / Landscape						
Erosion	Watercourses traversed by the corridor; access roads	Visual inspection; incident reports; annually	Erosion Offroad driving	No evidence of erosion No evidence of offroad driving	RNT EM	Included in RNT's obligations
Biodiversity / landscape						
Protection of trees and vegetation	Servitude and access roads	Visual inspection; annually	Unnecessary tree felling Ground clear-felled	No evidence of unnecessary tree felling No evidence of clear-felling	RNT EM	Included in RNT's obligations
Alien invasive species	Servitude and access roads	Visual inspection; incident report (if necessary) annually	Presence of alien invasive plant species	No evidence of alien invasive vegetation plant species	RNT EM	Included in RNT's obligations
Bird and mammal mortalities	Servitude	Visual inspection; incident report (if necessary) every 6 months	Number of bird and mammal mortalities	No evidence of mortalities	RNT EM	Included in RNT's obligations
	Servitude	Visual inspection; incident report (if necessary) quarterly	Number of bird and mammal mortalities	No evidence of mortalities	Ecologist	Refer to costing table (Table 9.1)
Reptile mortalities	Access roads	Visual inspection; incident report (if necessary); every 6 months	Number of reptile mortalities	No evidence of mortalities	RNT EM	Refer to costing table (Table 9.1)
Heritage						
Heritage resources	Heritage sites adjacent to access roads	Visual inspection, annually	Erosion	No evidence of erosion	RNT EM	Included in RNT's obligations

Parameters	Sampling: Location and requirements (if applicable)	Sampling: Method and Frequency	Indicator	Target	Responsibility	Estimated Cost
Waste						
Waste	All project activities	Records, annually	Waste to landfill avoided (tonnes p.a.) Waste to landfill recycled (tonnes p.a.) Waste to landfill reused (tonnes p.a.)	Minimal waste to landfill	RNT	Included in RNT's obligations
Hazardous materials						
Pesticide use	Servitude and access roads	Visual inspection every 6 months Records of pesticide application	Use of herbicide (*If used then refer to relevant monitoring measures below as well as application of checklist in Section 11.2*)	No herbicides used (manual bush clearing preferred)	RNT EM	Included in RNT's obligations
	Servitude and access roads	Records: Chemical records, training records, storage facilities, application methods, safety procedures, effectiveness of chemical used Annually	Staff trained Choice of chemical Correct application of chemical (season, conditions, procedures) Storage and handling of chemicals	All staff trained / certified All records retained All procedures followed All equipment stored correctly	RNT EM	Included in RNT's obligations
	Areas where herbicide applied	Survey 6 months after application (Year 1)	Impacts on adjacent vegetation from herbicides Impacts on protected tree species from herbicides	No evidence of impacts to adjacent vegetation from herbicides No evidence of impacts on protected tree species from herbicides	RNT EM	Included in RNT's obligations

Parameters	Sampling		Indicator	Target	Responsibility	Estimated Cost
	Location and requirements (if applicable)	Method and Frequency				
	Areas near perennial water bodies	Records of complaints Visual inspection after herbicide application and again 6 months after application	Watercourse buffers applied Complaints regarding water quality	No evidence of herbicide application within watercourse buffer areas No complaints regarding water quality	RNT EM	Included in RNT's obligations
	Areas where herbicide applied	Survey 1 year application (Year 2)	Extent of coppicing and regrowth	Limited coppicing and regrowth in areas of application	RNT	Included in RNT's obligations
Community health and safety						
Signage on electrical infrastructure	On infrastructure and any replacement infrastructure	Visual inspection; on commencement of and as per scheduling for maintenance activities	Signage present	All electrical infrastructure accessible to the public to have signage	RNT	Included in RNT's obligations
Occupational health and safety						
EMF safety programme	N/A	Prior to operation	EMF safety programme prepared	To be specified in the programme	RNT	Included in RNT's obligations
Cross-cutting issues						
Stakeholder engagement	N/A	Progress reports Registration sheets Complaints forms; Every 6 months	Number of personnel on SEP implementation team Number of SEP actions / activities implemented Budget spent on SEP Number of complaints received regarding SEP	Compliance with SEP Zero complaints relating to SEP activities	RNT CLO	Refer to costing table (Table 9.1)
Vulnerable groups engagement	N/A	Progress reports Registration sheets Complaints forms; Every 6 months	Number of VGP actions / activities implemented Budget spent on VGP Number of complaints received regarding VGP	Compliance with VGP Zero complaints relating to VGP activities	RNT CLO	As per above

Parameters	Sampling: Location and requirements (if applicable)	Sampling: Method and Frequency	Indicator	Target	Responsibility	Estimated Cost
Community awareness training	At PACs	Refer to VGP methods and frequency of monitoring	Refer to VGP indicators	Refer to VGP targets	RNT CLO	Refer to costing table (Table 9.1)
Grievance Mechanism	N/A	Established pre-construction, incidents monitored monthly during construction; incidents monitored every 6 months during operation	Number of complaints % repeated complaints Average speed of resolution % closed-out % escalated to alternative dispute resolution	Zero complaints, Zero repeated complaints Resolution of complaints within 30 days All complaints closed out Zero complaints escalated	RNT CLO	Included in RNT's obligations

5.4.4 All Phases

Overall project performance and effectiveness in terms of sustainability will be measured on an annual basis. A detailed biophysical and social baseline document will be produced during the pre-construction phase that provides for a baseline as a reference against which predicted changes will be measured. The process will identify relevant quantitative indicators and targets. The indicators and targets identified for specific project phases above can be included where relevant.

Parameters	Sampling		Indicator	Target	Responsibility	Estimated Cost
	Location and requirements (if applicable)	Method and Frequency				
Project performance						
Sustainability	N/A	Annual	Indicators and targets to be established once the detailed baseline has been documented. Examples include: • Natural habitat lost / restored (ha) • GHG emissions during project lifecycle (tonnes CO_2 equiv. emissions saved, captured or displaced) • Waste to landfill avoided / recycled / reused (tonnes) • Direct operational jobs (number of women, youth and indigenous people) • Number of training opportunities provided (number of women, youth and indigenous people) • Number of households benefitting • Length of power lines constructed/rehabilitated • Reduction in electricity losses • Total Energy Savings (KWh)		RNT	Included in RNT's obligations

6 Training and environmental and social awareness

6.1 Objective

Training is required to ensure that all personnel are trained, qualified and competent as far as environmental and social aspects of their roles are concerned, throughout the project's lifecycle. In addition, communities will also be involved in awareness training to ensure they are aware of the project activities and associated risks, their rights, obligations and of the existence of the grievance mechanism during all project phases. This community awareness training will contribute to promote the resilience of local populations.

6.2 Environmental and social management

6.2.1 Institutional

Training is an essential component to build institutional capacity and to ensure that the ESMP is effectively implemented. It should: (1) raise awareness of the ESMP; (2) gain commitment at all levels; and (3) provide people the knowledge and skills that they need to comply with the ESMP. This training will also provide insights into cross-cutting issues such as climate change, ecosystem services and the protection of indigenous and vulnerable groups, including gender-related issues.

There should be a distinction made between those needing basic training, and those requiring more advanced ESMP implementation training to carry out their responsibilities. This includes both social and environmental components. A training-needs matrix should be developed to identify the relevant RNT employees, and their capacity to undertake and implement the various actions in the ESMP, as well as to address any gaps. On this basis, a detailed training programme must be developed to meet the needs of the organisation.

An in-house training programme for specific non-environmental personnel (particularly management) that require basic training, should be developed and implemented during the pre-construction phase. An example of relevant topics to consider is included in Table 6.1 below.

Table 6.1: Project staff, and involvement per project phase (adapted from IFC ESMS Toolkit, 2015)

Department	Relevant topics for training
Senior management	Introduction to project Environmental and Social Governance including national legislation requirements, IFC PS, DBSA ESSS and tools like the ESMS; Applicable sectorial/industry best practices.
ESMP Team	Introduction to ANNA Project Environmental and Social Governance including national legislation requirements, IFC PS, DBSA ESSS, tec.; identification and evaluation of environmental and social risks and impacts; stakeholder engagement; monitoring of performance indicators; internal auditing; and environmental and social reporting.
Human Resources Department	Introduction to IFC PS 2 – Labour and Working Conditions; hiring, non-discrimination, anti-harassment, remuneration and other labour policies; effective complaint management and resolution procedures for workers; and worker-management interaction.
Workers and managers	Introduction to ESMS; ESMS policies; instructions on new or modified operational procedures relevant to the tasks performed (e.g. waste management procedure; storage and handling of hazardous chemicals; use and maintenance of PPE); emergency response procedures; instruction on complaint management system; worker-management interaction.
Procurement	Supply chain assessment based on environment and social requirements; supply chain audits.

Signed registers for all training must be kept on record.

6.2.2 Contractor

The contractor must undertake training during construction in the form of induction training, as well as a scheduled series of ongoing sessions (toolbox talks), as indicated below.

6.2.2.1 Induction training

Induction training will be done prior to site establishment and before construction commences, and a refresher will be conducted after every break (for example the holiday closure period over December/ January).

All contractor teams must be briefed on their environmental and social obligations in terms of this ESMP. Environmental awareness training must also ensure that all workers understand the risks and how to implement effective mitigation measures. It is recommended that training be undertaken by the EM and CLO, with inputs from the ECO. The education/awareness programme should be aimed at all levels of management and construction workers within the contractor's team (handled in separate sections). A translator should be provided where necessary, at the cost of the contractor.

The contractor should retain attendance registers on completion of any training (all attendees must sign these registers as proof of attendance and of their comprehension of the content) and make these available to the ECO or relevant authority on request.

Content of the training and inductions **may** include the following (as relevant):

- Material to ensure that all personnel understand their roles and responsibilities, as well as the implications of non-compliance with the ESMP (punitive measures that may be instituted against them directly).
- Material to address, but not limited to:
  - Contents of the code of conduct and consequences for failing to adhere to them;
  - Basic environmental awareness;
  - Safety on site;
  - Basic hygiene;
  - Climate change adaptation;
  - Prevention of water, soil, and air pollution;
  - Waste management system (hazardous, non-hazardous and domestic waste);
  - Prevention of soil erosion and sedimentation;
  - Water-saving practices;
  - Energy-saving practices;
  - Protection of ecological resources;
  - Basic principles of materials handling and storage;
  - Fire risks and prevention;
  - Emergency preparedness and incident responses;
  - Spill response provisions;
  - Social awareness and responsibility (including HIV/AIDS and TB awareness, as well as respect for cultural sensitivities);
  - "Chance finds" procedures for cultural/heritage resources; and
  - Administrative and reporting procedures.

6.2.2.2 Ongoing environmental training

Relevant environmental site matters, incidents and issues must form part of the contractor's ongoing environmental training, which could take the form of toolbox talk sessions. These sessions must be used as a tool for continuous training of employees and must be conducted weekly. It is also recommended that the toolbox talks are conducted in an interactive way so as to ensure that the employees understand the content and purpose of the ESMP requirements. The contractor shall keep records of the environmental subjects discussed in the toolbox talk sessions.

As construction continues, an effort must be made by the contractor to assess the training needs of workers on site. If necessary, additional training on environmental and social requirements must be conducted to ensure all workers understand the risks, as well as how to mitigate them.

6.3 Health and safety

For construction, a site-specific Operational Health and Safety (OHS) Plan is required (refer to Section 5.3.15) and will be developed by the Contractor once project detail is known.

For operational purposes, RNT's corporate health and safety policy, guidelines, standards and operating policies are to be referenced.

6.3.1 Basic OHS training

A basic occupational training program and speciality courses should be provided, as needed, to ensure that workers are oriented to the specific hazards of individual work assignments. Training should include the following:

- Basic hazard awareness, site-specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate;
- Generally be provided to management, supervisors, workers, and occasional visitors to areas that pose risks and hazards;
- Workers with rescue and first-aid duties should receive dedicated training so as not to inadvertently aggravate exposures and health hazards to themselves or their co-workers; and
- Include the risks of becoming infected with blood–borne pathogens through contact with bodily fluids and tissue.

Through appropriate contract specifications and monitoring, the Implementing Authority should ensure that service providers, as well as contracted and sub-contracted labour, are trained adequately before assignments commence.

6.3.2 Traffic safety management

Induction for drivers and other employees should include traffic safety management as per measures provided in the Traffic Safety Management Plan (Section 5.3.16).

All workers should receive the necessary training to operate the vehicles, plant equipment (and associated equipment) that they use.

All workers need to be aware of, and understand, the traffic rules, site and community safety policies, and traffic safety procedures, as well as any restrictions on vehicle size or type.

Training in terms of incident reporting, should be provided during the inductions, and include information relating to:

- Prioritisation of urgent medical treatment for injured people, before reporting of the incident;
- Who should be informed of incidents;
- How the incident should be reported; and
- What the time limits for reporting incidents and feedback are.

6.3.3 Visitor orientation

If visitors to the site may be able to gain access to areas where hazardous conditions or substances may be present. A visitor orientation and control program should be established to ensure that visitors do not enter hazardous areas unescorted.

6.3.4 New task training

Workers and contractors, prior to the commencement of new assignments, must receive adequate training and information, thereby enabling them to understand related work hazards and to protect their health from hazardous ambient factors that may be present. The training should adequately cover:

- Knowledge of materials, equipment, and tools;
- Known hazards of the operations, and how they are controlled;
- Potential risks to health;
- Precautions to prevent exposure;
- Hygiene requirements;
- Wearing and use of protective equipment and clothing; and
- Appropriate response to operation extremes, incidents and accidents.

6.3.5 Other communication

- Appropriate marking of hazardous areas, installations, materials, safety measures, and emergency exits, etc. is required. Signage is to be in accordance with international standards and easily understood by all (refer to Section 5.3.14).
- Labelling of equipment is required. All containers that may contain substances that are hazardous, as a result of chemical or toxicological properties, temperature or pressure, should be labelled as to the contents and hazard, and/or appropriately color-coded. Similarly, piping systems that contain hazardous substances should be labelled to indicate the direction of flow and the contents of the pipe, and/or color-coded whenever a pipe, passing through a wall or floor, is interrupted by a valve or junction device.
- Communication of hazard codes is required.
- Copies of the hazard coding system should be posted outside the facility, at emergency entrance doors and fire emergency access systems, where they are likely to come to the attention of emergency services personnel.
- Information regarding the types of hazardous materials stored, handled or used at the facility, including typical maximum inventories and storage locations, should be shared proactively with emergency services and security personnel to expedite emergency response when needed.
- Representatives of local emergency and security services should be invited to participate in periodic (annual) orientation tours and site inspections, to ensure familiarity with potential hazards that are present.

6.3.6 Operation and maintenance

In addition to the general OHS requirements above, the following training, with regards to operation and maintenance, is also required:

- Pesticide application – Provide those responsible for deciding whether to apply pesticides, with training in pest identification, weed identification, and field scouting. Personnel should also be trained as to the correct application of pesticides, and ensure that personnel have received applicable certifications, or equivalent training where certifications are not required.
- Live power lines – Working within the minimum safe working distances, which includes the installation, maintenance, or repair of electrical equipment, should only be undertaken by trained and certified workers.
- Working at height – Training in climbing techniques and the use of fall protection measures is required.
- Electric and magnetic fields - Training of workers in the identification of occupational EMF levels and hazards is necessary.

6.3.7 Monitoring of training

Signed registers, for all induction, environmental training and awareness programmes, must be kept on record.

The Contractor must monitor the performance of workers to ensure that the information conveyed during their induction has been properly understood and is being applied/followed.

6.4 Community awareness

Community awareness training is required at the pre-construction, construction and operational phases of the project, for the following activities:

- During construction, to address the risk of contracting diseases, a health awareness and education programme is required, which should include the following:
  - Communicable diseases – Address factors that may influence individual behaviour, as well as promoting individual protection, and protection of others, from infection, by encouraging condom use.
  - Vector-borne diseases - Appropriate educational material should be distributed that relates to risks, prevention and available treatment.
  - Gender – Address specific risks to women and girls from non-local workers, including sexually transmitted diseases (especially HIV/AIDs) and unwanted pregnancies. Men should also be educated on their support to women. Include awareness of Gender Based Violence (GBV) prevention and response, including sexual harassment and rape involving both men and women. Educate communities on the relevant legal instruments in this regard.
  - Trafficking – address potential vulnerabilities of the community to trafficking in persons.
- Safety training for the local communities should include:
  - Identification of a liaison point(s) for community facilities such as schools, clinics and community centres, at which information can be disseminated to communities.
  - Identify suitable means of dissemination of information, which may include pamphlets, fliers, radio announcements and/or skits at schools. It is essential for children to be included.
  - Prohibited behaviour and correct practices are to be clearly communicated, including bush clearing by fire for agricultural purposes.
  - Pre-construction and construction phase issues include demining, traffic safety, and construction site risks.
  - Climate change awareness and adaptation.
  - Operational phase issues include safety risks with regard to electrical components.
- During all project phases, community training on incidents, and the Grievance Reporting Mechanism (set out in Section 8), must be made widely available, on laminated sheets, to communities, including at public places such as schools, police stations, clinics, community centres, to ensure that it is readily available when required. This must, at a minimum, indicate:
  - Who should be informed of an incident;
  - How incidents should be reported; and
  - What the time limits for reporting incidents and feedback are.
- With regard to the protection of natural resources, training on the Grievance Mechanism should include the request for communities to report any outsiders that are illegally using natural resources within the study area, so that it can be followed up by the CLO.
- Community awareness programmes should be prepared and implemented in consultation with the relevant local/regional social workers. The materials for such training programmes should be packaged in a way that can be replicated for social workers to use on other projects in the future.
- During all project phases, where communities are employed, appropriate training should be provided, with the intention of skills development, capacity building and promoting resilience, so that these skills can be transferred to other projects in the future. Areas of potential training include

bush clearing, identification of alien vegetation, environmental monitoring, etc. Training should be specially tailored for Vulnerable Groups, specifically Indigenous Peoples due to the language barrier, skills levels and any cultural sensitives. Furthermore, women should also receive tailored training to build technical competencies. Women from affected communities should be hired and trained to implement education and awareness-raising activities. This could form part of the Local Employment and Procurement Plans described in Section 5.3.11.

7 Emergency preparedness and response

It is important to prepare how to respond effectively, in order to prevent and minimise harm to workers, the community and the environment, should a momentary lapse, or a gap, in the system occur (e.g. a person not properly trained, a person not following proper procedure, a machine breakdown), or an external force, such as a natural disaster, is experienced, which may lead to an accident or emergency situation at the site or facility. What is provided in this document is a Framework Plan, but a detailed Emergency Preparedness and Response Plan must be developed for the construction and operational phases, taking into account the relevant policies and standard operating procedures of RNT.

7.1 Hazard identification

Construction activities for the project can pose potential hazards or threats. The most effective response to any situation is awareness of the hazard, its potential effects and consequences, and an understanding of the resources and actions necessary to respond to it. Listing all the potential hazards, and details of each response, is not appropriate for this Framework Plan.

Reponses to different events may vary as the event evolves, but reasonable response methods and responsibilities will be determined in future updates to this Plan. Scenarios that may be considered are, *inter alia*:

- Equipment or structure failure;
- Electrocution;
- Serious personal injury or fatality (e.g. vehicle accident or snake bite etc.);
- Weather conditions;
- Natural disasters; and
- Evacuation.

Responses should be identified for each scenario. Table 7.1 serves as an example.

Table 7.1: Example of an emergency response procedure for fire

Purpose and Scope	Set out the responsibilities and activities to respond to a fire-related emergency.
Definitions	**<u>Fire emergency</u>** A situation which poses or signals an immediate threat in the form of an imminent threat of uncontrolled fire, smoke or burning, uncontrolled release or spillage of flammable or combustible substances, and trigger of the fire alarm.
Responsibility and Authority	Project Manager Health and Safety Officer **Approving Manager: Construction Manager**
Emergency Response Team	Emergency Co-ordinator
Training	Induction training Training of use of fire-fighting equipment
Reference Documents	Evacuation plan, site plan with locations of assembly points, fire-fighting equipment and first-aid stations.
Records	Training logs, drill logs, fire-fighting and medical equipment maintenance, and inspection logs.
Issue/Revision date	Issue 1
Response	
If a fire is detected, report it to the site office immediately, or to one of the emergency telephone numbers.	
When the alarm (siren) sounds, commence with the evacuation drill.	
Take all your valuable items with you.	
Determine if the fire can be extinguished within an appropriate time limit with the portable equipment on site. If the equipment is adequate, use it to extinguish the fire. If not, call the fire department, activate the alarm and evacuate.	

7.2 Responsibilities

RNT and the Contractor are responsible for the effective response to any emergency situation or event related to the construction, operation and maintenance of the project. To ensure a co-ordinated and effective response, a chain of command will be developed as part of this Plan, and followed in the event of an emergency.

In the establishment of a chain of command, considerations such as the level of activation, and the participation necessary to respond to specific situations, are to be taken into account. The following are factors to consider for the establishment of a chain of command:

- Type of event (natural, environmental, electrical supply/outage, external forces);
- Severity and geographic area (multiple or combination of events);
- Anticipated duration;
- Multi-division/discipline response required; and
- External agency co-ordination.

7.3 Emergency communications

A communications diagram must be included in the Plan to allow for easy interpretation and reaction times.

An emergency contacts list must be developed so that the relevant public and emergency response agencies are contacted. This emergency contact list shall be developed at the start of construction and be updated throughout the project by the Contractor to ensure accurate contact information.

Emergency plans and contact lists should be kept at easy-to-access locations for quick access.

7.4 Ongoing activities

Procedures should be prepared for:

- Induction, which should include these emergency procedures, and responsible personnel should be trained accordingly;
- Documenting first aid and emergency medical treatment;
- Reviewing and updating the emergency response plan to reflect changes and ensuring that employees are informed of such changes; and
- Using, inspecting, testing, and maintaining the emergency response equipment.

8 Grievance Mechanism

8.1 Objective

The Grievance Mechanism (GM) refers to a complaint instrument through which project-affected persons and communities may raise their concerns to the project developer and find ways through which these grievances could be handled throughout the project lifecycle. It also provides a mechanism for workers to raise workplace concerns during the construction phase. Refer to the SEP and RPF for more detail on external stakeholders in this regard.

8.2 Terminology and definitions

The Grievance Mechanism uses the following definitions:

- **Complainant**: An individual, community group or organisation that submits a verbal or written complaint against the project or Contractor;
- **Complaint or grievance**: Any expression of dissatisfaction with the project/Contractor activities that a complainant wants to resolve. Grievances usually refer to actual or perceived specific incidents, damage or impact;
- **Dispute**: A point of disagreement between the project and one, or more, aggrieved parties; and
- **Concern or issues**: Concerns or issues may be defined as a question, comment, requests for information, or general perceptions that may, or may not, be related to a specific impact or incident. If not addressed satisfactorily, concerns may become complaints.

8.3 Publicising of the Grievance Mechanism

For the GRM to work effectively, the process must be known by potential complainants and considered as legitimate by them. Thus, the GRM, and avenues for lodging a complaint, will be widely publicised within the project area.

8.4 Construction

The Contractor will erect a project signboard at the construction location/s and maintain it throughout the construction period. The sign shall contain the relevant emergency telephone numbers and email address where specific site project staff may be reached, and where grievances may be lodged. As part of the SEP, the mechanism will be also be communicated verbally at community and public meetings during community engagement exercises.

The Contractor should also inform their workers of the Grievance Mechanism as part of their induction, and ensure that it is accessible to them and that they are aware that anonymous grievances may be lodged.

8.5 Operation

The Implementing Agent will erect a project noticeboard at conspicuous locations along the servitude, or in public places in settlement areas along the line route, providing the contact details (telephone and email) where grievances may be lodged.

8.6 Grievance management process

The GM follows the steps presented below, beginning with the receipt of the complaint, and ending with its resolution or close-out.

1. **Receive**

Any project-affected party who has a reasonable belief that a DBSA funded project or programme may potentially result in a health or environmental risk or adverse impact, may raise a concern or report a complaint verbally in person, or through a trusted representative (face-to-face or by phone), or in writing (letter or e-mail) through any of the following channels:

- Community Liaison Officer (CLO), (during project construction and operation);
- Contractor local office, in project area (during project construction);
- RNT local office branches (during project operation); and
- DBSA Grievance Manager: Libby Dreyer, Tel: +27 82 888 6258 / +27 11 313 3507, E-Mail: libbyd@dbsa.org; or
- https://www.dbsa.org/EN/About-Us/ContactUs/Pages/default.aspx

The concerns or grievances must be genuine and be raised without malice and in good faith. When reporting a concern or grievance it is important that the complainant provide sufficient information that will enable thorough investigation. When a verbal or written complaint is received the CLO record these in the complaints form with as much detail as possible (data, time, name, contact details, preferred means of contact, nature of grievance or complain) and forwards it to complaints coordinator. The complaints coordinator assigns a unique registration number, enters the complaint into the complaints database.

2. **Acknowledge**

Once a complaint has been registered, complainants should receive a timely acknowledgement that their case is in the system. The complaints co-ordinator prepares a letter of acknowledgement of receipt, and the CLO delivers the letter to the complainant or their representative (face-to-face), and verbally explains the next steps and their timeframes. When delivery of a letter is not possible, the acknowledgement should be in another culturally-appropriate manner (for example, in person).

Acknowledgement will occur within 24 to 48 hours of the complaint being received and acknowledgement of receipt of the concern and/or grievance will be communicated to the complainant through email and/or in writing.

3. **Assess and assign**

The Complaints Co-ordinator undertakes preliminary screening of the complaint to determine whether: (i) it is a complaint (not a concern or issue); (ii) the complaint is related to project activities or whether it needs to be referred to another party; or (iii) the complaint involves an allegation regarding a human rights violation or a possible criminal activity. Grievances outside the scope of the GRM should be referred to an appropriate office/level, for managing through different processes.

The level of severity can help to quickly identify what action is required to address the grievance, in proportion to the severity of its potential impact. Grievances can be classified as “low”, “moderate” or “high”.

Conducting a rapid assessment (within 24 – 48 hours) can help to satisfactorily address smaller issues, so that they do not escalate. It can also remove the need for investigation and, if possible, close out the complaint. Many complaints can be addressed quickly by the Complaints Co-ordinator. However, if assessment indicates that a complaint is complicated, or that the facts are less clear, a field investigation will be initiated to provide evidence for analysis, as well as to support the resolution, and it will be assigned to the department with the relevant technical expertise to conduct the investigation, or one that is associated with the complaint.

4. **Investigate**

Depending on the nature of the complaint, the investigation may need to involve specialists who should take measures to build confidence in the fact-finding process, by:

- Conducting an investigation as speedily as possible and communicating the outcomes/action-plan to the complainant within three weeks (15 working days);
- Investigators, ideally, meeting face-to-face with the complainant. The investigating team could encourage complainants to be accompanied by their representative;
- Considering the use of interpreters to avoid misunderstanding;
- Documenting the facts: The investigating team should prepare a succinct report on investigation findings. All information gathered should be maintained and/or logged to ensure that a project company's response is fully documented; and

Ensuring co-ordination with the investigating team and the complainant. Throughout the investigation process, complainants should be kept informed of progress. If the project company is unable to provide a response within an agreed period, an updated timeframe should be provided.**5. Response**

The grievance investigations will be reviewed at monthly project meetings and will remain active until resolved and until an official response is provided to the aggrieved. The outcome of the investigation will inform whether:

- A complaint is found to be unrelated to the project. In this case, the complainant is informed (other avenues can be suggested) and the complaint is recorded as closed;
- There is evidence to prove that the complaint is false, in which case the complainant is informed of the investigation's findings and the complaint is recorded as closed;
- A complaint is found to be unsubstantiated, in which case the complainant is informed of the investigation's findings and other possible avenues can be indicated;
- A complaint options in order to be resolved. It is important to verify that the proposed resolution addresses the root cause of the grievance, so as to minimise the chance of recurrences. It is also important to check whether the proposed resolution is in line with the complainant's human rights (and that, in solving the complainant's grievance, another person's rights are not infringed upon);
- Where feedback within three weeks (15 working days) is not possible, the person, community of project stakeholder will be notified of the reason of the delay.

In some cases, the proposed resolution should be discussed with the complainant, rather than unilaterally announcing the verdict. The complainant should have an opportunity to accept or reject the proposition, or to offer an alternative for discussion. Dialogue and negotiation should take place on an equal power base (this means that the complainant should be allowed to bring their representative to accompany them during discussions regarding the response to the investigation). If the response is rejected, another resolution process may be needed.

The final agreement should be concluded both verbally and in writing. It must be specific, time bound, agreed upon by both parties, and generally remain confidential. However, the complainant themselves may choose to make the outcome public.

The DBSA Stakeholder Engagement and Information Disclosure Standard (ESSS 2) provides for circumstances in which a complainant is unable to obtain an adequate response. In this case, the complainant should bring their concerns directly to the DBSA, following the procedures outlined on their website[1]. These procedures should be shared with stakeholders so that they may follow the correct approach if a situation arises, and should form part of the Grievance Plan.

5. Resolve or appeal

The GRM should consider a recourse, or appeals, mechanism, for complaints where the complainant and the operation are unable to reach agreement. If access to a judicial process is complex, too costly or unavailable, the project and the complainant may mutually agree to negotiation, facilitated by a neutral third party (mediation professional or organisation, an NGO, a lawyer or other respected local, a national or international figure). This neutral third party will be agreed on between the project company, and the

[1] https://www.dbsa.org/EN/About-Us/ContactUs/Pages/default.aspx

complainant or aggrieved parties. Findings will be non-binding to either party and will not preclude either party from pursuing legal action.

6. Follow up and close-out

Once a resolution has been agreed upon, or a decision made, the response must be implemented and monitored (adjustments may be necessary to ensure that the root causes of complaints are addressed, and that outcomes are consistent with the spirit of the original agreement concluded with the complainant).

Grievance close-out occurs after the implementation of an agreed resolution has been verified. Results must be documented, and the parties' evaluation of the process must be requested (close-out form). Even when an agreement is not reached, it is still important to close the case.

Conducting a follow-up and close-out can assist in maintaining the complainant's trust. It is suggested that implementation of a response and a complaint close-out, occur within thirty days of the complaint being received.

9 Budget for ESMP implementation

At this stage of the project lifecycle, a full suite of management plans and procedures have not yet been developed. The core management plans, some of which have been developed as frameworks, will still need to be expanded on, once the project design is finalised.

With regards to construction, this ESMP will form part of the construction tender documents to be published, to ensure that the activities required to be placed under the responsibility of the Contractor, will be accurately costed for as part of their proposal.

The following table provides a preliminary ESMP budget estimate, based on the primary cost of implementation, and including all remaining plans and procedures that need to be developed. For operation, a 5-year period has been provided for, after which it is recommended that the inputs and associated costs are reviewed.

It should be noted that this budget should be refined once the detailed design is available and there is more certainty regarding project activities. The resettlement and compensation costs specifically require revisiting; also once the opportunity for net positive contribution of the project has been further considered (as listed in Section 8.8 of the ESIA), this budget can be refined

Table 9.1: Budget for implementation

Item / Action	Assumptions and comments	Unit Price (USD)	Unit	Budget (USD)
Pre-construction Phase				
Project Environmental and Social Management System	-	$ 100.000	1	$ 100.000
Project Stakeholder Engagement Plan	-	$ 100.000	1	$ 100.000
Project Resettlement Action Plan	Upper range based on number of PAPs, travelling costs, number of engagements, political interference, disagreement on compensation, project design changes.	$ 500.000	1	$ 500.000
Compensation of Project Affected People (through RAP)	Cost estimate of the physical resettlement in Angola, including a 15% disturbance allowance.	$ 6.830.540	1	$ 6.830.540
Detailed Project Baseline (as reference for monitoring and evaluation in Section 5.4.4)	30 days desktop only	$ 400	30	$ 12.000
Project Performance monitoring and evaluation Plan	75 days desktop only	$ 400	75	$ 30.000
Ecologist walk-through, mapping of sensitive areas (including engagements with team) and input to contractor specifications for rehabilitation requirements and assistance on adjudications	21 days fieldwork (including travel costs) plus 5 days reporting	$ 650	26	$ 16.900
Preparation of a booklet on protected tree species as a RNT resource	5 days desktop work	$ 400	5	$ 2.000
Heritage walk-down and mapping, including revision of Grave Relocation Plan (GRP) and engagement with Social specialist	21 days fieldwork (including travel costs) plus 5 days reporting	$ 650	26	$ 16.900
Water Plan (as per VGP)	Extent of water infrastructure to be revised after quantification of affected VGs	$ 475.000	1	$ 475.000
Community Education and Awareness Plan (as per VGP)	Preparation of materials, training of CLO & RNT ECO, pilot training sessions, follow-up	$ 60.000	1	$ 60.000
Institutional Training - basic ESG and ESMS awareness	10 days (materials and training) plus travel	$ 750	10	$ 7.500
Institutional Training - implementation of ESMP	10 days (materials and training) plus travel	$ 750	10	$ 7.500
GHG Plan	Unit price	$ 3.000	1	$ 3.000
Emergency Preparedness and Response Plan	2 days desktop only	$ 400	2	$ 800
Bird flight diverters	Price per linear km	$ 8.000	50	$ 400.000
‘Net positive contribution’ initiative	Unit price	$ 920.000	1	$ 920.000
Sub-Total (USD)				**$ 9.482.140**
Construction Phase (period considered 36 months)				
Natural/ecological resources monitoring	4 x 15 day visits (60 days/year including travel costs)	$ 650	180	$ 117.000
Environmental awareness materials and training (capture and removal of fauna, identification of dangerous/ protected species etc.)	10 days (materials and training) plus travel	$ 750	10	$ 7.500
Heritage resources monitoring	4 x 15 day visits (60 days/year including travel costs)	$ 650	180	$ 117.000
Heritage specialist to update DHMP (twice a year)	Annually	$ 1.500	3	$ 4.500
Heritage awareness materials and training (identification of resources and procedures)	10 days (materials and training) plus travel	$ 750	10	$ 7.500
Heritage specialist to implement “Chance Finds” mitigation	As and when required (per site - assume 1 per year including travel)	$ 3.500	3	$ 10.500

Item / Action	Assumptions and comments	Unit Price (USD)	Unit	Budget (USD)
Water quality sampling (when working across Cunene and Caculuvar rivers and other ephemeral watercourses containing water, as per Section 5.4.2)	Cost per month (assume 3 months for the crossing of each main river plus 3 months for ephemeral watercourses)	$ 500	9	$ 4.500
Stormwater quality sampling (ad hoc)	Cost per sample (assume 2 per year)	$ 500	6	$ 3.000
Air quality sampling (ad hoc)	Cost per sample plus specialist reporting (assume 1 per year including travel)	$ 5.000	3	$ 15.000
Noise sampling (ad hoc)	Cost per sample plus specialist reporting (assume 1 per year including travel)	$ 5.000	3	$ 15.000
Community awareness training (support)	3 days every 6 months (including travel)	$ 650	18	$ 11.700
Sub-Total (USD)				**$ 313.200**
Operational Phase (for a 5 year period)				
Bird and mammal monitoring	Annually - 60 days (15 days x 4 visits per year including travel costs)	$ 39.000	5	$ 195.000
Training maintenance staff on identification of alien plant species	Once -off - 1 day	$ 650	1	$ 650
Monitoring of herbicide management plan (including water quality sampling)	Annually - 20 days (10 days x 2 visits per year including travel costs)	$ 13.000	5	$ 65.000
Sub-Total (USD)				$ 260.650
Decommissioning Phase				
Decommissioning Plan	Unit price including travel costs	$ 50.000	1	$ 50.000
Sub-Total (USD))				**$ 50.000**
GRAND TOTAL (USD)				**$ 10.105.990**

10 ESMP reporting, monitoring and auditing

The ESMP is a working document, as described in Section 5.1, and requires continual review to ensure that performance is maintained.

10.1 Monitoring

10.1.1 Pre-construction and Construction Phases

The ECO will routinely monitor the site for compliance with the ESMP and must engage with the other parties where relevant. Activities include the following:

10.1.1.1 Routine site meetings

- The purpose of the meetings will be to discuss general construction progress. The meetings must be held between the Implementing Agent, the Owner's Engineer, the Contractor, the ECO and the CM.
- Monthly meetings are to align with the compliance inspections below.
- Minutes shall be kept of these meetings.

10.1.1.2 Routine compliance inspections

- Monthly, for all active sites, or at the defined intervals as provided in the conditions of the EL, if these are more frequent.
- Inspections include visual inspections and consultations/interviews with other staff, e.g. Environmental Manager or CLO.
- Documenting the findings of each of the inspections. This may take the form of a diary entry, a checklist, a report, or similar, but should include dated photographic evidence of any identified issues (where possible). Any findings of non-compliance must be clearly communicated to the Contractor, together with timeframes for the implementation of remedial action and close-out.
- Inspections should include any environmental-related grievances that have been reported to the CLO.

10.1.1.3 Monthly reports:

- These summarise the findings of the routine compliance inspections, as well as progress on any remedial action required during the month in question.
- In the event of non-compliance, the report may include:
  - Relevant/supporting documentation or evidence of the non-compliance (e.g. minutes of any meetings held to discuss the non-compliance, email/written correspondence on the matter, dated photographic evidence).
  - Remedial action to remedy non-compliance or prevent recurrence, including responsible persons and deadlines for actions.
  - Date/s of close-out by the Contractor on previous non-compliance findings.
- Reports must be made available to the Contract Manager and the Contractor, as well as to the environmental authority on request.
- Attend, or submit monthly reports to, monthly progress meetings, which shall include the Owner's Engineer, the Contractor and the EO (or representatives).

The monthly reports must also include the record of all monitoring activities performed within the concerned month, as defined in Section 5.4.

10.1.1.4 Quarterly reports:

The quarterly reports summarise the events and actions taken within the monthly reports, and assess the monitoring records against the targets set out in Section 5.4. These reports provide an opportunity to check whether the indicators and targets set, are adjusted to the project reality and mitigate the anticipated impacts, and whether the residual impacts are within the expected range. If deviations for set targets are identified, these reports should be used as a tool to assess the causes for these deviations and, if the level of non-conformities is considered high, to review and adjust the proposed mitigation measures to ensure that environmental and social performances are kept within the required standards.

These summary reports can also act as an opportunity to include enhancements to the project performance and/or adjust the targets to higher levels, if a positive pattern is detected.

The quarterly reports should be submitted to the Implementing Agent, Owner's Engineer and Independent ECO for information and comment.

10.1.1.5 Annual report:

The annual report compiles, assesses and summarises the information set out in the quarterly reports. This report provides the opportunity to have an overview of the project performance within the yearly period, and should be submitted to the Environmental Authorities (if required) and Sponsors, as proof of environmental and social performance of the project, after being reviewed and approved by the Implementing Agent, Owner's Engineer and Independent ECO.

10.1.1.6 Environmental incident reporting

- The Contractor shall document any environmental incidents that occurred as a result of the construction activities, and any resulting action taken to remedy the harm, and/or prevent repeat occurrences.
- The Contractor should notify the ECO and the project manager about all environmental incidents that occurred on the site during the relevant reporting period.
- The Contractor must ensure that all environmental incidents are investigated and that remedial actions are implemented to address the root causes of the incidents.
- The ECO monitors that the Contractor follows the necessary procedures and responses to close out the incident within the specified timeframe.
- The CLO should become involved where necessary to ensure that any incidents that affect PAPs/ PACs are communicated, and followed up on, effectively.

10.1.1.7 Reporting

10.1.1.7.1 Record-keeping

Copies of documentation required by the ESMP must always be available on site. They shall be retained and be easily retrievable, for the duration of the Contract, and shall be filed by the Contractor for a minimum of 12 months after Contract completion.

These records and documents must be made available to the Implementing Agent, Owner's Engineer, Independent ECO and the competent environmental and social authorities upon request.

At a minimum, the following documents must be kept in the environmental file:

- Copies of all monthly, quarterly and annual reports, as requested in this ESMP;
- Records of all monitoring/sampling campaigns performed within the scope of this ESMP, as defined in Section 5.4.;
- Records of negotiations relating to land access and physical access plans;
- Copy of this ESMP and all reviews/update versions of this document;
- Copy of the Installation EL;
- Copy of water-use licenses;
- Copy of all other relevant permits, licences and wayleaves;
- Environmental incident reports;
- Staff induction attendance registers;
- ECO audit reports;
- Certificates for waste disposal and transport;

- Disciplinary action (including time penalties or monetary fines) for environmental transgressions;
- Other environmental audits such as authority audits; and
- Photographic records showing conditions pre and post construction, as well as post-construction after rehabilitation.

Stakeholder-related documentation, in relation to the SEP, the VGP or the GM, is also to be retained on site. This includes the following:

- The Complaints Register managed as part of the Grievance Mechanism (refer to Section 8); and
- Any agreements with PAPs/PACs as part of the SEP, the VGP or the GM shall be recorded in writing, signed by all parties (including the Implementing Agent) and filed.

10.1.1.8 Non-conformance with the ESMP

If a transgression of the ESMP conditions, or ECO, Owner's Engineer or Authority instructions, or legal requirements, occurs due to negligence, or due to wilful disregard, this may result in disciplinary action (e.g. a time penalty or a monetary fine, withholding payment certificates if in accordance with the terms of the Contract, or legal action). The terms of Contract shall include mechanisms for disciplinary action (such as the issuing of penalties and fines, or dismissal or removal from site of certain persons or equipment), and the recovery of monies due (including for any remedial costs where these were borne by a third party).

The Contractor is required to comply with the environmental management requirements of this ESMP at all times. Any failure on their part to do so will entitle the Project Manager, in consultation with the ECO, to impose a fine, where deemed necessary. The value of the fine will be agreed on between the Project Manager and the ECO, based on the nature, extent and duration of the offence and on subsequent environmental damage. Such penalties shall be payable in addition to any remediation costs for correction of environmental damage caused by the non-conformance.

In addition, the Owner's Engineer may also instruct the Contractor to remove from site any person(s) who, in their opinion, is guilty of misconduct or incompetence or who is grossly negligent or guilty of repeat non-conformances.

Where the Project Manager deems the Contractor to be in breach of any of the requirements of this ESMP, he may order the Contractor to suspend the progress of the works, or any part thereof.

The ECO also has the authority to stop any works until a matter is resolved if, in his/her opinion, there is, or may be, a serious threat to, or impact on, the environment, directly caused by the Contractor's actions or activities. In all such work-stoppage situations, the ECO is to inform the Contractor of the reasons for the stoppage within 24 hours.

In the event of a non-conformance, the ECO will be required to compile an Incident Report. This report must describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. The Incident Report must be updated on completion of the corrective measures. The report must indicate whether the remediation measures have been implemented timeously and must assess the effectiveness of the remediation measure/s in order to close out the non-conformance to the satisfaction of the ECO and Project Manager.

The Contractor is deemed to have contravened the ESMP and/or the specification above if:

- Within the boundaries of the works, site extensions and access roads, there is evidence of contravention of the requirements of the ESMP;
- Environmental damage ensues due to negligence and repeat offences;
- The Contractor fails to comply with corrective or other instructions issued, within a specified time;
- The Contractor fails to comply with a site instruction given by the Engineer, based on the ECO report;
- The Contractor fails to respond adequately to complaints from the public; and
- The Contractor is found guilty, or pays an admission of guilt fine, for non-compliance with environmental legislation.

10.1.2 Operational Phase

Compliance monitoring by the Implementing Agent during the operational phase can take place less frequently, as required by the Implementing Agent's management procedures, the lender requirements, the ESMP and/or the EL (whichever requires the most frequent monitoring). However, as a minimum, it must be undertaken twice a year (6 month intervals), once during the dry season and once during the rainy season.

Monitoring includes compliance inspections, as set out in Section 5.4., and associated assessment reports. Should it be considered necessary, these environmental and social monitoring activities can also entail meetings with the Implementing Agent, the Sponsors or the relevant Authorities on site.

As a minimum, an annual report, which includes compiling, assessing and summarising the information set out in the operation monitoring reports, should be submitted to the Environmental Authorities (if required) and Sponsors, as proof of environmental and social performance of the project, after being reviewed and approved by the Implementing Agent and Independent ECO (if applicable).

10.2 Auditing

An on-site verification audit programme is required, which will define scheduling, conducting, and documenting of internal and external health, safety, environmental and social audits. It should focus on the following:

- Avoidance of a recurrence of non-conformances;
- Execution of timeous corrective actions;
- Conducting follow-ups with site management to ensure that non-conformance is corrected and that recommendations are implemented, within required timeframes;
- Report any areas of non-compliance with corrective actions to the Implementing Agent's project manager and/or relevant management structure; and
- Ensure methodical record-keeping is being done.

The Implementing Agent holds the responsibility of ensuring that audit recommendations are undertaken and used as an input to update the ESMP where necessary.

10.2.1 Construction Phase

During construction, an external auditor should be appointed to audit the project six months after commencement of construction, and thereafter every six months.

The auditor shall prepare a report, documenting the effectiveness of environmental management, problem areas, remedial actions proposed and taken, and compliance/non-compliance of the Contractor/s with regard to the ESMP.

The results of the audit will be discussed in project lessons learnt, ongoing environmental and social awareness training (e.g. toolbox talks), and project meetings, to ensure that best practice continues to be adopted on the ground.

On completion of construction activities, including rehabilitation, a close-out audit must be undertaken.

10.2.2 Operational Phase

During operation, this ESMP should be audited every five years by an external auditor, depending on the requirements of the third parties.

10.3 Safeguard Reporting

It is a requirement of the lender (DBSA) that safeguard reporting is undertaken every six months and that this should be performed both during the construction and operational phases. This task is the responsibility of the Independent ECO. This will include results and records of the monitoring of the indicators included in Section5.4. In addition, the project performance indicators set out in Section 5.4.4 will be reported on an annual basis and recommendations provided in order to support an adaptive management approach.

10.4 Review

Continual updates to the ESMP are required as part of the Plan-Do-Check-Act cycle. The findings of monitoring and audit results should inform these iterative changes. However, in addition, as and when the scope evolves, the specifications or requirements contained in this ESMP may need to be reviewed and amended to ensure applicability to the project.

It is recommended that the Implementing Agent reviews the ESMP on an annual basis during the pre-construction and construction phases, and every five years during the operational phase. Additional reviews can be undertaken in the event of any major change to the project or institutional changes.

The review should include the identification of additional environmental and social risks that may have emerged and should establish appropriate mitigation measures for such risks. This is done in consultation with the appointed Independent ECO, and submitted to the relevant environmental authority for approval.

11 Appendices

In Section 11.1 of this chapter, supporting figures referenced in this ESMP are listed, that provide locations of important areas and/or features and, in Section 11.2, the monitoring checklist for bush clearing and herbicide application is included.

11.1 Supporting figures: Locations of important areas/features

Figure 11.1: Main watercourses within the project route

Figure 11.2: Important habitats/areas for avifauna (Lubango to Gambos)

Figure 11.3: Important habitats/areas for avifauna (Gambos to Cahama)

Figure 11.4: Important habitats/areas for avifauna (Otchinjau to Namibia)

Figure 11.5: Significant heritage sites identified in the ESIA report

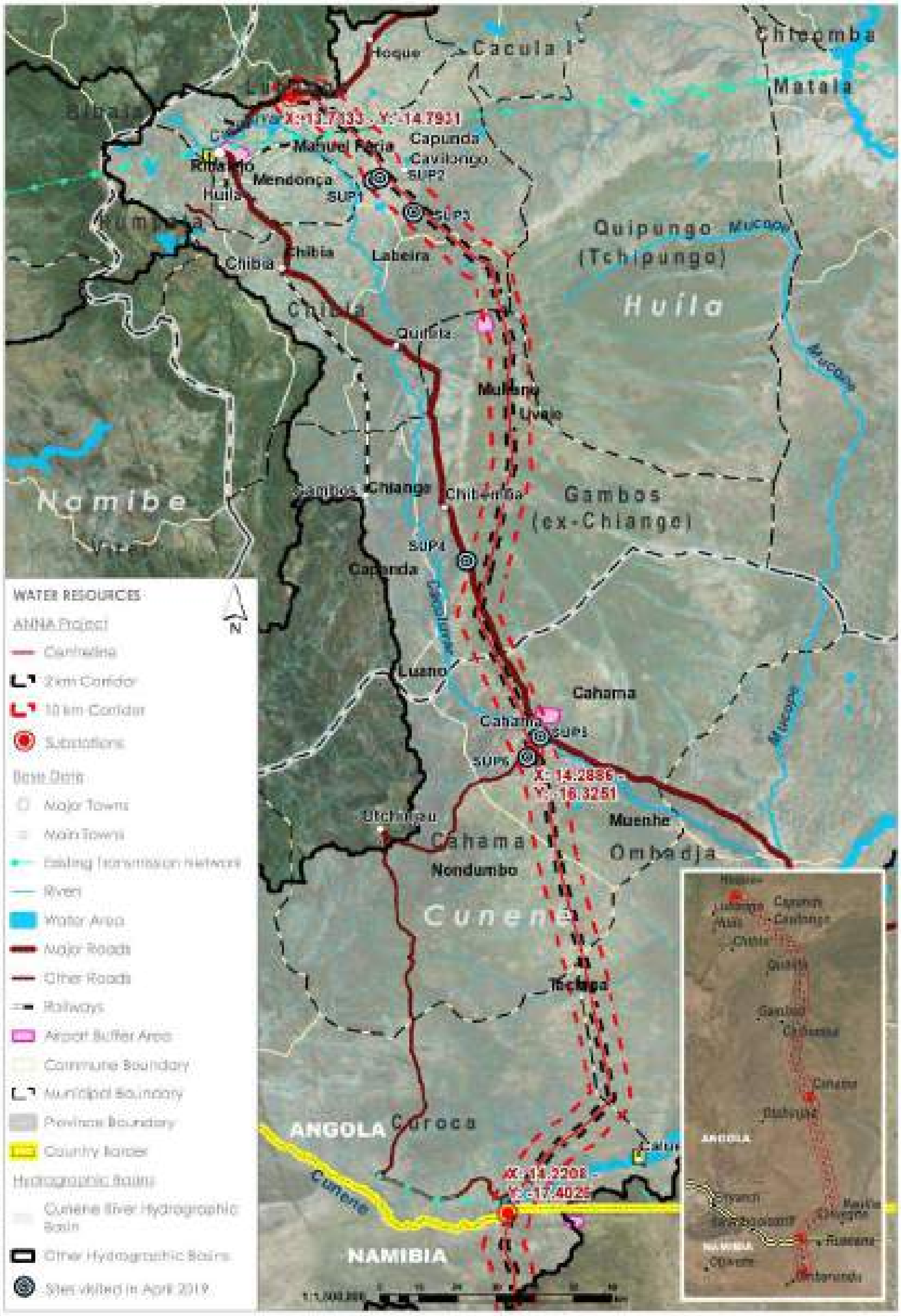

Figure 11.1: Main watercourses within the project route

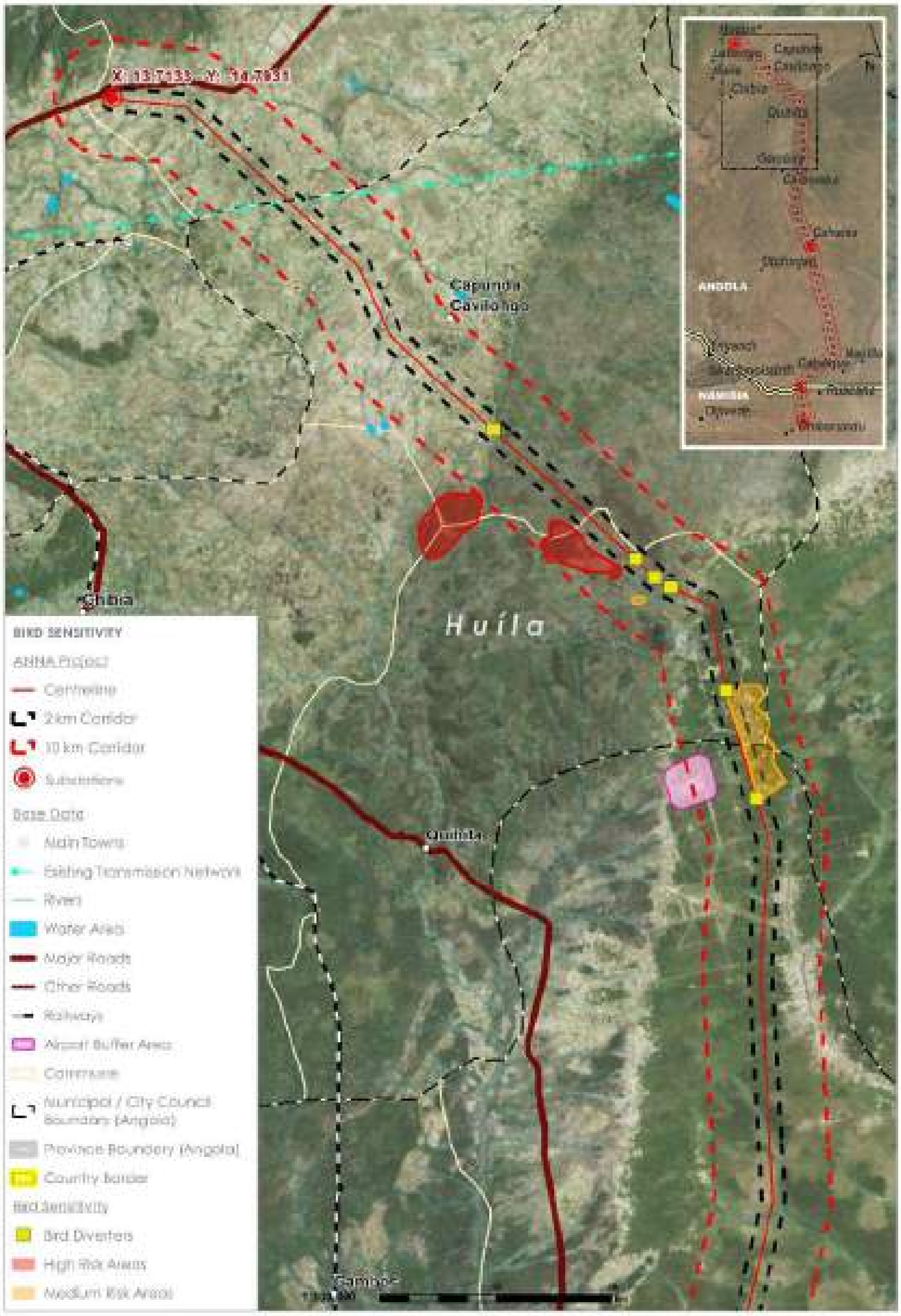

Figure 11.2: Important habitats/areas for avifauna (Lubango to Gambos)

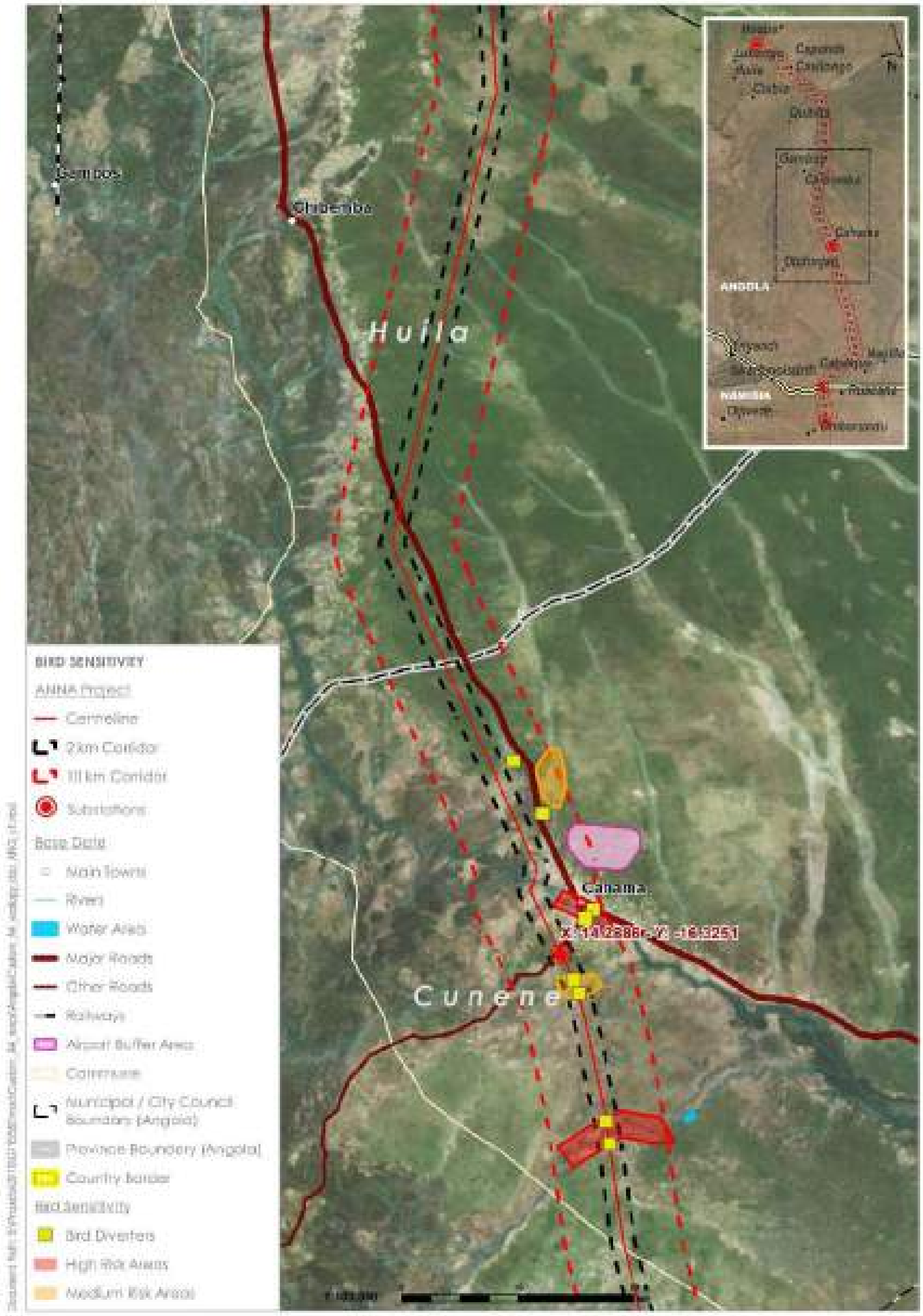

Figure 11.3: Important habitats/areas for avifauna (Gambos to Cahama)

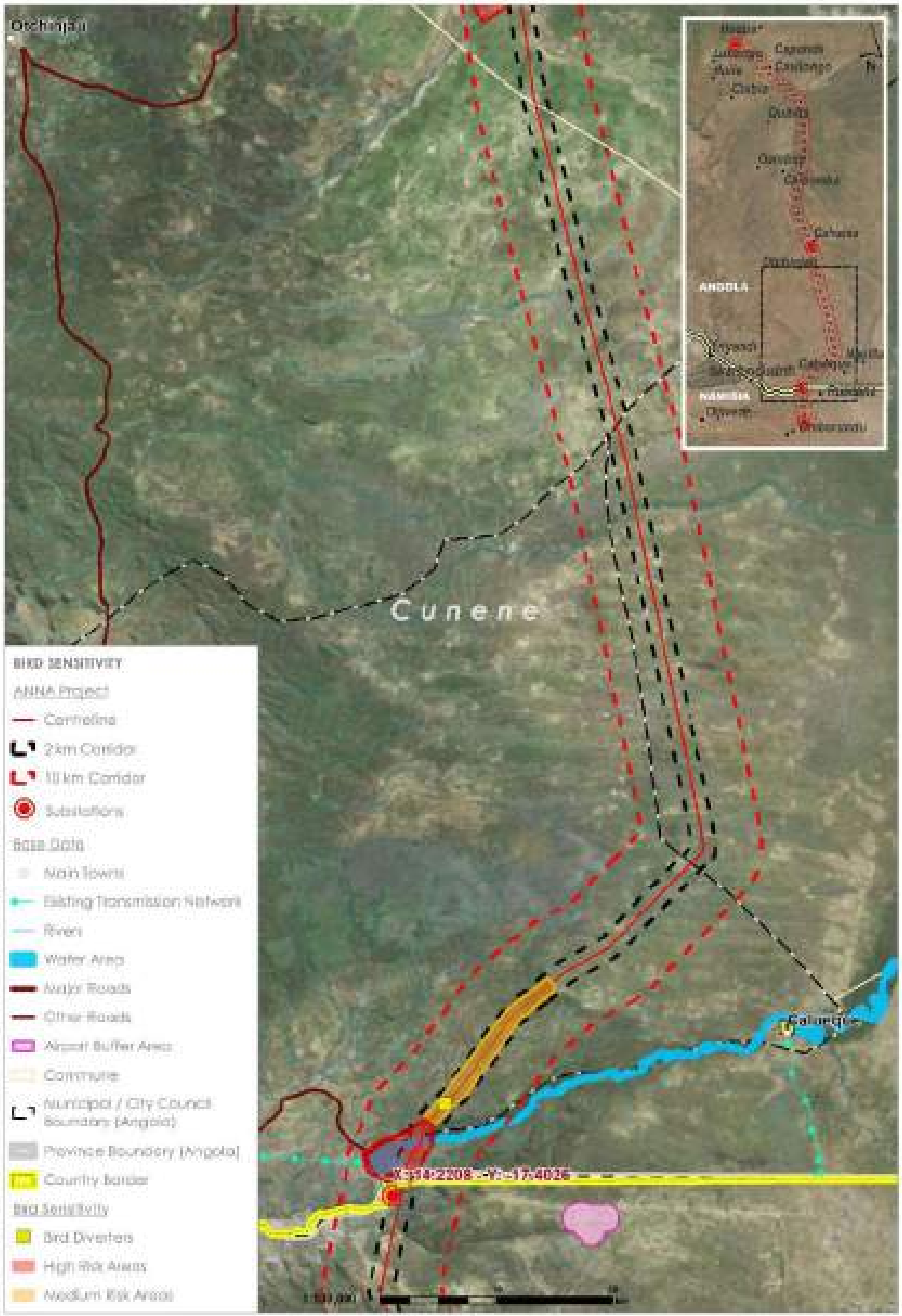

Figure 11.4: Important habitats/areas for avifauna (Otchinjau to Namibia)

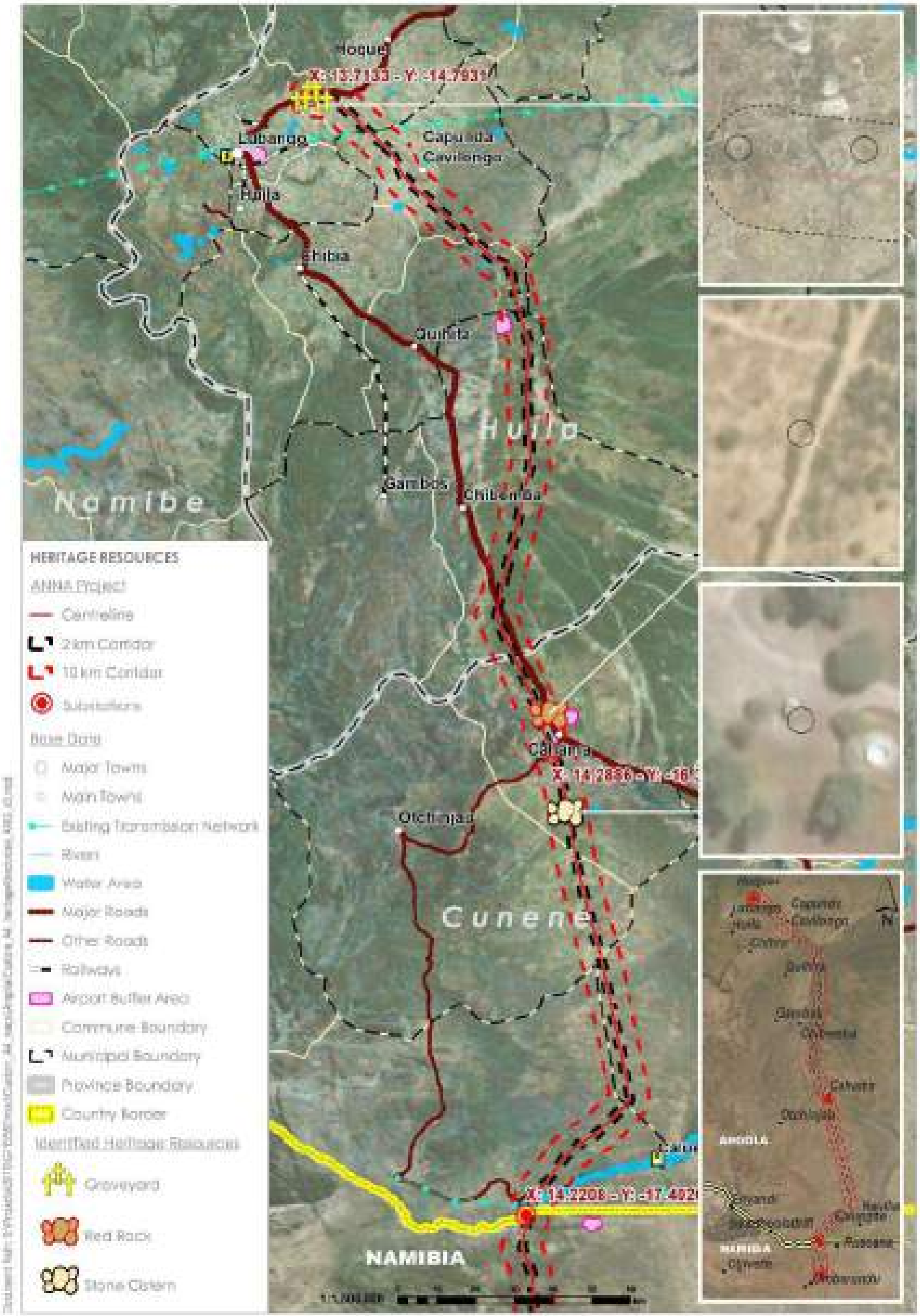

Figure 11.5: Significant heritage sites identified in the ESIA report

11.2 Herbicide application for bush clearing

Herbicide Control

<u>Introduction</u>

Numerous herbicides/arboricides are commercially available for the combating of bush thickening (the following section is adapted and derived from: Cunningham and Joubert 2002). Two broad types i.e. soil and foliar applied herbicides are available for use locally. Brand names such as Access, Bushwacker, Garlon, Graslan, Grazer, Grazon, Hyvar, Molopo, Pathway, Reclaim, Roundup, Savana, Spike, Tordon, Ustilan are currently in use or have been in use until recently in Namibia and Southern Africa. Although research into the effectiveness of some of the different herbicides has been conducted (Versveld 1988), very little research has focused on the ecological consequences of chemical control measures.

The main active ingredients used in herbicides commonly used and locally available are:

- bromacil/ethidimuron/tebuthiuron (e.g. Bushwacker, Graslan, Grazer, Molopo, Reclaim, Savana, Spike);
- glyphosates (e.g. Roundup);
- picloram (e.g. Access, Grazon, Pathway, Tordon); and
- triclopyr (e.g. Access, Garlon, Grazer).

According to Verdoorn (*pers.com.*) herbicides in general have a very low toxicity towards animals, including mammals, fish, amphibians and insects. He does however mention that there are two products that one should be concerned about – paraquat and diquat – that are quite toxic to animals:

Product names for paraquat include: Crisquat, Cyclone, Dextrone, Dexuron, Gramoxone Extra, Herbaxone, Ortho Weed and Spot Killer and Sweep.

Product names for diquat include: Aquacide, Aquakill, Dextrone, Diquat, Midstream, Reglone, Reglox, Reward, Tag, Torpedo, Vegetrole and Weedtrine-D.)

However, when used according to instructions, most products (except paraquat and diquat) pose very little threat to animal life.

When talking about biodiversity the entire natural system comes to mind and the impact of herbicides is then much more significant as they kill plants, i.e. the basis of the ecosystem. Plants are very important and if impacted upon by the incorrect and improper application of herbicides, the plant ecology will be destroyed and this will have a wide impact on all living organisms. Should the herbicides be used according to instructions, the impact is very low and the recovery of any impacted life forms is guaranteed. However, there are cases where herbicides have been applied incorrectly and the impacts have been vast (Verdoorn *pers.com.*). Verdoorn (*pers.com.*) furthermore states that the most important active ingredients to keep an eye on include the so called soil sterulants (i.e. tebuthiuron, ethidiumuron, bromacil, uracil and various others) as these should be considered to be products with potentially long term effects on plant life. Verdoorn (*pers.com.*) states that previously mentioned products would possibly have little direct effect on birds, mammals, etc., with the most significant problem being the impact on trees that support birds.

Areas treated by chemicals and/or artificially cleared – i.e. disturbed areas – are often colonised by the shrubs *Laggera decurrens* (Silky Sage; Wolbos) and *Pechuel-loeschea leubnitziae* (Wild Sage) which can form dense stands (*pers.obs.*). According to Burke (2012) *Laggera decurrens* is mostly found along disturbed areas; can taint the milk of animals that eat it and contains phytotoxins which suppress the growth of some species, consequently resulting in mono-specific stands. According to Roodt (1998) *Pechuel-loeschea leubnitziae* thrives on alkaline and sandy soil in disturbed areas. Although domestic stock are known to utilise it as a source of food, the meat and milk is often tainted (Roodt 1998) due to the aromatic properties of the plant. *Laggera decurrens* and *Pechuel-loeschea leubnitziae* are probably part of the new succession in the disturbed areas (after chemical bush control), but further monitoring and/or research is recommended regarding these shrub species.

Aerial application of herbicides is unselective and kills trees indiscriminately over large areas thus making it difficult to avoid protected and/or advantageous species. Hand application methods are more selective and can eradicate the unselective killing of tree species.

Whatever herbicide is used, exceptional care should be taken with the application thereof, especially with regards to dosages, as the incorrect use could harm and/or destroy non-target species.

Two broad types of herbicide are available – either applied as granules to the soil (e.g. Tebuthioron, Ethidimuron, Bromocil – active ingredients) or sprayed onto the plant and taken up by the aboveground parts of the plant (e.g. Picloram – active ingredient). Changes in trade names make recommending a specific brand difficult and therefore it is more important to know the active ingredient.

<u>Impacts on biodiversity</u>

The following are the possible effects that the active ingredients could possibly have on biodiversity as determined through a literature study on the topic (see Cunningham and Joubert 2002):

<u>*A. Bromacil/Tebuthiuron [Bushwacker, Destroyer, Graslan, Grazer, Molopo, Reclaim, Savana, Spike]*</u>

Acacia mellifera and Acacia reficiens are very sensitive while Dichrostachys cinerea is less sensitive to tebuthiuron as indicated by Versveld (1988) in the Grootfontein area. The effectiveness of tebuthiuron depends on the clay content of the soil with soils with clay contents >20% being less effective.

Ecological Effects:

Effects on birds: Tebuthiuron is practically nontoxic to birds (Anon 1994, Kidd and James 1991). However, according to Anon (1995a) it is slightly toxic to birds. Bromacil is toxic to birds at high dosages (Clayton and Clayton 1981).

Effects on aquatic organisms: Tebuthiuron is slightly or practically non-toxic to fish and other aquatic species (Anon 1994, Anon 1995b). On the other hand Anon (1995a) states that Tebuthiuron is slightly toxic to aquatic invertebrates and fish.

The median tolerance limit, or the concentration of bromacil that will kill 50% of the exposed fish after 48 hours of exposure, varies from 40 ppm to 164 ppm, depending on the type of fish tested (Clayton and Clayton 1981).

Effects on other organisms: Tebuthiuron is low in toxicity to mammals and it breaks down rapidly in mammals and also does not accumulate or build up in mammals (Anon 1995a).

Tebuthiuron is slightly toxic to bees (Anon 1995b) although Anon (1995a) states that it is not toxic to bees.

Tadpoles have a 48-hour median tolerance limit of 230 ppm bromacil (Clayton and Clayton 1981). In high dosages it is toxic to sheep and dogs. Bromacil is not toxic to either aquatic invertebrates or honeybees (Van Driesche 1985, Meister 1992).

Tebuthiuron is toxic to many plants. Even if a small amount comes in contact with roots it may injure or kill trees or shrubs (Anon 1995a). Smit et.al. (1999) and Anon (1994), state that other non-target trees may be affected even by selective application. Some tree species, especially “evergreens”, are not killed while D. cinerea requires very heavy dosages (Smit et.al. 1999). The destruction of stream-side vegetation should be avoided as it may adversely affect the habitat of some aquatic animals (Anon 1995). The use of tebuthiuron on range and pastureland could be a hazard to endangered plants (Anon 1995a).

Tebuthiuron is low in toxicity to soil microorganisms (Anon 1995a).

Environmental Fate:

Breakdown in soil and groundwater: Tebuthiuron is highly persistent in soil with reported field half-lives from 12 to 15 months in areas with over 1,000 mm annual rainfall and longer half-lives expected in drier areas or in soils with high organic matter content (Anon 1994). It is poorly bound to soil, suggesting high mobility. In field studies, however, little or no lateral movement has been seen in soils with appreciable clay or organic matter content (Anon 1994). Neither tebuthiuron nor its degradation products have been detected below the top 24 inches of soil in field studies (Anon 1994).

Bromacil binds, or adsorbs, only lightly to soil particles, is soluble in water, and has a relatively lengthy soil half-life (60 days). For these reasons, bromacil is expected to move (leach) quite readily through the soil and it can contaminate groundwater. The potential for bromacil to leach and contaminate groundwater is greatest in sandy soils (Van Driesche 1985). Bromacil should not be used near drinking water reservoirs or in well recharge areas because of its mobility in soil. Directions and precautions listed on product labels must be followed to minimize potential bromacil movement into groundwater (Van Driesche 1985, Meister 1992, Anon 1990). Field dissipation studies have shown that phytotoxic residues of bromacil have persisted in both sand and clay soils for longer than 2 years (Anon 1989).

Breakdown in water: No degradation was observed in a 33-day study of photolysis of tebuthiuron in water (Anon 1994).

There is little information available on the breakdown rate of bromacil in water, although a two-month half-life is suggested for this herbicide in clean river water which is low in sediment (Van Driesche 1985).

Breakdown in vegetation: Tebuthiuron is readily absorbed through roots and translocated to other plant parts. It produces its effect by inhibiting photosynthesis, the process by which plants receive light from the sun and convert it into energy (Anon 1994).

Bromacil is taken up rapidly by the roots and slightly absorbed through the leaves. Bromacil destroys most annual plants in the treated area (Melnikov 1971). Improper application of bromacil will destroy shade trees and other desirable vegetation. Label instructions should be followed carefully. Equipment and containers should not be emptied or rinsed out near desirable trees or shrubs (Van Driesche 1985).

B. Glyphosates [Roundup]

Ecological Effects:

Effects on birds: Glyphosate is slightly toxic to wild birds (Kidd and James 1991).

Effects on aquatic organisms: Technical, glyphosate acid is practically nontoxic to fish and may be slightly toxic to aquatic invertebrates (Anon 1994). Some formulations may be more toxic to fish and aquatic species due to differences in toxicity between the salts and the parent acid or to surfactants used in the formulation (Anon 1994, Anon 1985). There is a very low potential for the compound to build up in the tissues of aquatic invertebrates or other aquatic organisms (Anon 1985).

Effects on other organisms: Glyphosate is nontoxic (Anon 1994, Kidd and James 1991) or relatively non-hazardous (Tew 1996) to bees. Label instructions should still be followed carefully.

A study conducted in Australia suggests that glyphosate used to combat an alien weed species negatively affected an endangered indigenous plant species (Matarczyk et.al. 2002). The above-mentioned authors state that glyphosate may also affect biodiversity adversely.

Environmental Fate:

Breakdown in soil and groundwater: Glyphosate is moderately persistent in soil, with an estimated average half-life of 47 days (Anon 1994, Wauchope et.al. 1992). It is strongly adsorbed in most soils, even those with lower organic and clay content (Anon 1994, Wauchope et.al. 1992) and even though it is highly soluble in water, it does not leach appreciably, and has low potential for runoff (Edwards et.al. 1991, Wauchope et.al. 1992). One estimate indicated that less than 2% of the applied chemical is lost to runoff (Malik et.al. 1989).

Breakdown in water: In water, glyphosate is strongly adsorbed to suspended organic and mineral matter (Anon 1984) and its half-life in pond water ranges from 12 days to 10 weeks (Anon 1992).

Breakdown in vegetation: Glyphosate may be translocated throughout the plant, including to the roots. It is extensively metabolised by some plants, while remaining intact in others (Wauchope et.al. 1992).

C. Picloram [Access, Grazon, Pathway, Tordon]

Acacia mellifera and *Dichrostachys cinerea* are very sensitive to picloram as indicated by Versveld (1988) in the Otjiwarongo area. The effectiveness depends on the environmental conditions, stage of phenological development and application dosage. Versveld (1988) stated that at low dosages the small shrubs/trees of <2m were not seriously affected. He also states that at higher dosages the selectiveness of the application declines.

Ecological Effects:

Effects on birds: Picloram is slightly to practically nontoxic to birds (Anon 1984).

Effects on aquatic organisms: Picloram is slightly to moderately toxic to fish and aquatic invertebrates (Anon 1994). Most salts are of similar or lesser toxicity, but the isooctyl ester may be highly toxic (Anon 1983a). Picloram is not expected to accumulate appreciably in aquatic organisms (Howard 1991).

Effects on other organisms: The compound is nontoxic (Kidd and James 1991) or relatively non-hazardous (Tew 1996) to bees. Label instructions should still be followed carefully.

Environmental Fate:

Breakdown in soil and groundwater: Picloram is moderately to highly persistent in the soil environment, with reported field half-lives from 20 to 300 days and an estimated average of 90 days (Wauchope et.al. 1992). It is soluble in water, and therefore may be mobile (Kidd and James 1991). These properties, combined with its persistence, mean it may pose a risk of groundwater contamination (Howard 1991).

Breakdown in water: In laboratory studies, sunlight readily broke down picloram in water, with a half-life of 2.6 days (Anon 1994, Howard 1991).

Breakdown in vegetation: Picloram is readily absorbed by plant roots, less so by the foliage, and is readily translocated throughout plants. It remains stable and intact in plants (Anon 1994).

D. Triclopyr [Access, Garlon, Grazer]

Ecological Effects:

Effects on birds: Triclopyr is slightly to practically nontoxic to birds (Anon 1984, Anon 1994).

Effects on aquatic organisms: The parent compound and amine salt are practically nontoxic to fish (Anon 1984). The compound is practically nontoxic to the aquatic invertebrate Daphnia magna (a waterflea) (Gersich et.al. 1984). The compound has little if any potential to accumulate in aquatic organisms.

Effects on other organisms: The compound is nontoxic (Kidd and James 1991) or relatively non-hazardous (Tew 1996) to bees. Label instructions should still be followed carefully.

Environmental Fate:

Breakdown in soil and groundwater: In natural soil and in aquatic environments, the ester and amine salt formulations rapidly convert to the acid, which in turn is neutralised to a relatively nontoxic salt. It is effectively degraded by soil microorganisms and has a moderate persistence in soil environments (Anon 1984). The half-life in soil ranges from 30 to 90 days, depending on soil type and environmental conditions, with an average of about 46 days (Anon 1983b). Longer half-lives may occur in cold or arid conditions. Triclopyr is not strongly adsorbed to soil particles and has the potential to be mobile (Anon 1984).

Breakdown in water: Triclopyr is not readily hydrolyzed at pH 5 to 9 (Anon 1984). Reported half-lives in water are 2.8 to 14.1 hours, depending on season and depth of water (Anon 1983b). The ester formulation half-life is from 12.5 to 83.4 hours (Anon 1983b).

Breakdown in vegetation: Triclopyr is readily translocated throughout a plant after being taken up by either roots or the foliage. The estimated half-life in aboveground drying foliage as in a forest overstory is 2 to 3 days (Anon 1984).

General recommendations:

- Herbicides should be used with caution (avoid use where possible and only use where absolutely necessary);
- The application methods should stringently be adhered to;
- Techniques should be employed and/or investigated that minimises impacts on non target native species;
- Herbicides that are deemed non-target specific and/or which are mobile (all granular products) should be avoided as these would kill trees indiscriminately; and
- Even "modern" herbicides have some effect on biodiversity and/or haven't yet been tested on all species especially under local conditions and circumstances. It is thus important to remember that there are no 100% "safe" herbicides.

Application Methods

The following application methods and applicable advantages and disadvantages are derived from Tainton (1999):

a. Soil Applied Herbicides (e.g. Tebuthiuron, Ethidimuron and Bromacil)

Advantages:

- Rapid treatment;
- No mechanical treatment;
- Residual effect can suppress seedling regeneration for up to 4-5 years;
- Most inexpensive of the chemical methods;
- Small quantities required depending on the species.

Disadvantages:

- Non-target species affected due to root spread;
- Slow acting (becomes active when rain water carries it into the soil profile and may take up to 2 years to kill target trees/shrubs;
- Dead trees remain standing and nutrients in wood are not available for use by other plants;
- Required dosages are affected by soil's clay and organic matter content – e.g. the higher these levels, the higher the dosages and some chemicals not effective with soil content >35%;
- Some tree species (e.g. especially evergreens) are not killed;
- Some require large dosages (e.g. *D. cinerea*);
- Dead trees left standing are unattractive.

b. Plant Applied Herbicides (e.g. Access)

Advantages:

- Application can be selective when applied by hand and little danger of non-target species being affected;
- Trees which are cut and then treated, die immediately;
- Trees cut can be used to recoup some of the costs – e.g. firewood, charcoal, etc.;
- Aesthetically pleasing.

Disadvantages:

- Time consuming;
- Labour intensive;
- More expensive than other methods (e.g. aerial).

c. Aerial Application

[In addition to any other advantages/disadvantages which apply to plant applied herbicides in general, the following apply specifically to aerial application]

Advantages:

- Uniform application – no individuals escape treatment;
- Large areas handled rapidly;
- Little labour required.

Disadvantages:

- Expensive;
- Valuable plants also affected – i.e. non-selective.

Recommendations

Various other bush clearing techniques are not discussed in this report, but include hand clearing (bush pick, axe, etc.), mechanical clearing (bulldozer, grader, etc.), fire, browsers and biological. Although hand clearing, and in some case, mechanical clearing may be used by RNT to clear vegetation beneath various lines throughout Angola, it is a slow and tedious process with many labour related issues although advantageous from a job creation perspective. Chemical control measures are now being investigated as an alternative.

From an ecological perspective, hand clearing would be the best technique to employ. This would also have added social benefits – i.e. job creation. However, if this is not feasible for whatever reason(s) then the following is recommended regarding chemical application:

All chemicals have potential negative environmental consequences, but identifying the active ingredient and effect it may have on the environment as well as most important flora species in an area (protected, etc.) including high risk habitats (e.g. drainage lines, rocky outcrops, etc.) beforehand, coupled with environmentally acceptable mitigating factors, lessens the overall impact of chemical use.

The following is suggested should chemical control measures be implemented:

Table 1: Recommendations should chemical control measures be implemented

Aspect	Recommendations
Herbicide	Access 240SL (or any other similar products with the active ingredient stated below – e.g. Garlon, Turflon, Pathfinder, Brush-B-Gone, Confront, Crossbow)
Active ingredient	Triclopyr (Not listed by FSC – Forestry Stewardship Council – Highly Hazardous chemicals – see www.ic.fsc.org) (FSC 2017)
Application	Foliar application – spray – is recommended as this is target specific. Access mixed with water and Actipron (wetting agent).
Technique	The herbicide can be applied directly to the plant – stem or leaves – as a spray. Trees and shrubs with a stem diameter <10cm can be sprayed directly, but trees with a stem diameter >10cm should be felled before treatment of the cut surface for best results. Treatment should be done as soon as possible after felling and the entire cut surface and stump should be wetted. Coppice growth can also effectively be controlled.
Use	Active growing season – i.e. September to April (best in early growing season – September to November – before main rains) has best results.
Concentration	Foliar application = 350ml/100l water + Actipron Super 500ml/100l spray mix. Cut stump application = 2l/100l water + Actipron Super 2l/100l spray mix.
Repeatability	Year 1: Apply herbicide (early growing season) Year 2: Follow-up to target any regrowth and coppicing (early growing season) Thereafter: As required – i.e. dependent on coppicing potential of various species. This could be determined during routine line inspections.
Area	See areas classified as “high” sensitivity – i.e. unique features and/or viewed as biodiversity sensitive areas (“hotspot” areas). Chemical should not be applied to these areas; especially water features (e.g. rivers, etc.) classified as “high” sensitivity, but rather revert to hand clearing.

Depending if the proposed recommendations within this report are incorporated aimed at indicating environmental sensitivity and commitment, the selective use of the proposed herbicide is not expected to seriously negatively affect any “unique” vertebrate fauna and flora along the ANNA transmission line.

Monitoring checklist for bush clearing

Table 2: Monitoring checklist for bush clearing

		Compliance	
		Yes	No
1	**Activity: Bush clearing**		
1.1	Obtain necessary licences in terms of the national Angolan legislation		
1.2	Manual clearing conducted only for vegetation high enough to cause a disruption/fire risk to infrastructure (unless within road access area)		
1.3	Area adequately cleared – i.e. 12m from centre line		
1.4	Protected tree species on 12m boundary only trimmed		
1.5	Protected tree species not affecting line left *in situ*		
1.6	Raptor and vulture nesting sites left undisturbed		
1.7	Overall access improved		
2	**Activity: Chemical application**		
2.1	Justification for absolute need to use herbicides		
2.2	Active ingredient used = Triclopyr		
2.3	Application method used = spray		
2.4	Application technique used = spray leaves/cut stumps		
2.5	Application season = Sep to April (Sep to Nov = best)		
2.6	Application conditions = no wind		
2.7	Application procedures = IPE (protective masks/equipment used)		
2.8	Application knowledge = certified users only		
2.9	Storage = safe/secure		
2.10	Storage = chemical register maintained		
2.11	Storage = equipment clean/functional		
2.12	Concentration: Foliar application = 350ml/100l water + Actipron Super 500ml/100l spray mix		
2.13	Concentration: Cut stump application = 2l/100l water + Actipron Super 2l/100l spray mix		
2.14	Repeatability: Year 1		
2.15	Repeatability: Year 2		
2.16	Repeatability: Year 3		
2.17	Sensitive “hotspot” areas avoided, including 100 m from watercourses		
2.18	Water – open surface water encountered		
2.19	Water – open surface water samples taken		
2.20	Collateral damage observed (i.e. non-target areas/species affected)		
2.21	Any complaints from communities		

Annexures

Annexure A: Stakeholder Engagement Plan (SEP)
Annexure B: Vulnerable Group Plan (VGP)
Annexure C: Resettlement Policy Framework (RPF)

Annexure A: Stakeholder Engagement Plan (SEP)

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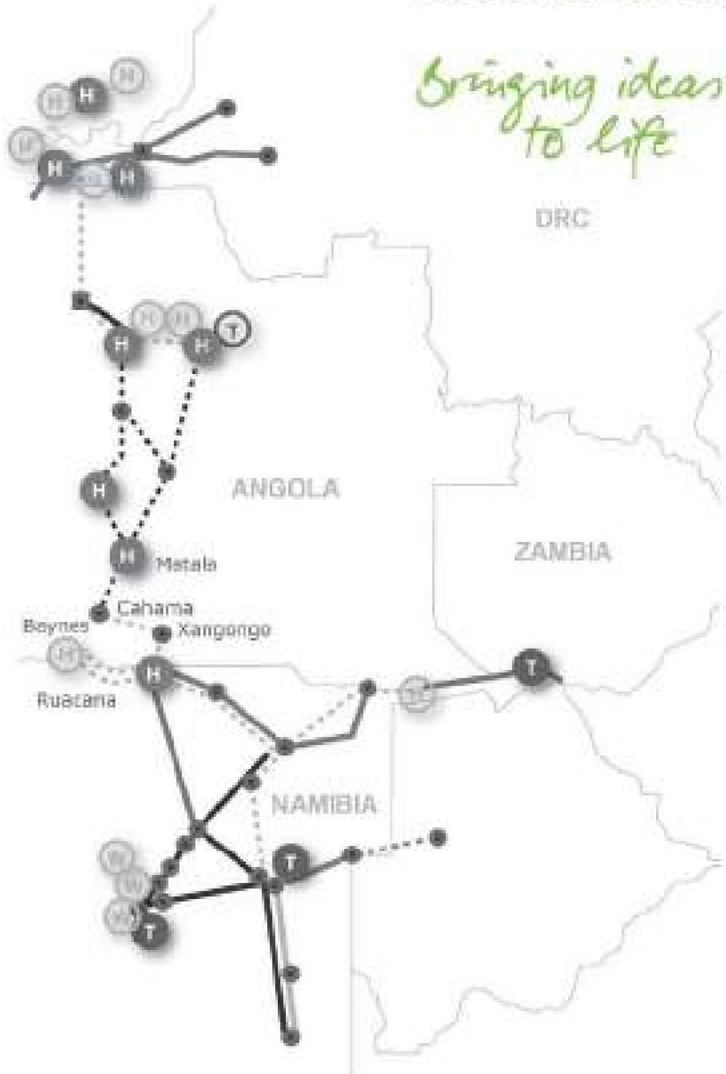

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ANNA

TRANSMISSION PROJECT

ANNA TRANSACTION ADVISORY SERVICES

Environmental and Social Impact Assessment

Angola

Volume III - Environmental and Social Management Plan

Annexure A: Stakeholder Engagement Plan (SEP)

March 2020

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TABLE OF CONTENTS

List of Figures

List of Tables

ABBREVIATIONS

Abbreviation	Definition
AAAC	All-Aluminium Alloy Conductor
AC	Alternating Current
ACSR	Aluminium Conductor Steel Reinforced
AIDS	Acquired Immune Deficiency Syndrome
AML	Lubango Municipal Administration (Administração Municipal do Lubango)
ANNA	Angola-Namibia Interconnector Project
ANR	National Waste Agency - Agência Nacional de Resíduos
BAU	Business as Usual
BCE	Before the Common Era
BESS	Battery Energy Storage System
°C	Celsius
CBD	Convention on Biological Diversity
CCS	Carbon Capture and Storage
CE	Common Era
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COP	Conferences of the Parties
DAI	Direct Area of Influence
DBSA	Development Bank of Southern Africa
DoD	Depth of Discharge
DNPAIA	Direcção Nacional de Prevenção e Avaliação de Impactes Ambientais - National Direction for Prevention and Assessment of Environmental Impacts
DRC	Democratic Republic of Congo
EBRD	European Bank for Reconstruction and Development
ECB	Electricity Control Board
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
EL	Environmental Licence
EMF	Electromagnetic Field
ENDE	National Electricity Distribution Company
ENSO	El Niño–Southern Oscillation
EO	Environmental Officer
EPC	Engineering, Procurement, Construction
EPFI	Equator Principles Financial Institution
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESSS	Environmental and Social Safeguard Standard
EU	European Union
Ex	Extinct Species
FACTS	Flexible AC transmission systems
FI	Financial Intermediary
FNLA	National Front for the Liberation of Angola
FPIC	Free, Prior and Informed Consultation
GCM	Global Climate Models
GEF	Global Environment Fund
GHG	Greenhouse Gas
GIS	Geographic Information System
GM	Grievance Mechanism
GRAE	Angola's Revolutionary Government in Exile
GWP	Global Warming Potential
ha	Hectare
HDPE	High-density polyethylene
HIV	Human Immunodeficiency Virus
HVAC	Heating, Ventilation and Air Conditioning
HVDC	High Voltage Direct Current

Abbreviation	Definition
IAI	Indirect Area of Influence
I&AP	Interested and Affected Party
IBA	Important Bird Area
ICP	Informed Consultation and Participation
IFC	International Finance Corporation
INDC	Intended Nationally Determined Contribution
INRH	National Institute of Water Resources of Angola
IP	Indigenous People
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IRP	Integrated Resource Plan
ISO	International Standards Organization
IUCN	International Union for Conservation of Nature
km	Kilometre
kT	Kilo Tonnes
kV	Kilovolt
LIDAR	Light Detection and Ranging
LLSU	Large Livestock Stock Units
L&FS	Life and Fire Safety
LSA	Later Stone Age
LVIA	Landscape and Visual Assessment
masl	Metres above sea level
MANco	Management Committee
MAV	Maximum Allowed Values
m	Metre
m^2	Square Metre
MCDM	Multi-Criteria Decision Making
MFA	Armed Forces Movement
MINAMB	Angolan Ministry of Environment
MPI	Multidimensional Poverty Index
MPLA	People’s Movement for the Liberation of Angola
MSA	Middle Stone Age
MVA	Mega Volt Amp
MW	Megawatt
MWh	Megawatt Hour
MWp	Megawatt Peak
NamPower	Namibia Power Corporation (Proprietary) Limited
MRV	Maximum Recommended Values
NAPA	National Adaptation Programme of Action
NOx	Nitrous Oxide
NTS	Non-Technical Summary
OCGTs	Open Cycle Gas Turbines
OECD	Organisation for Economic Co-operation and Development
OHS	Operational Health and Safety
OPEC	Organization of the Petroleum Exporting Countries
OPGW	Optical Ground Wire
OPHI	Oxford Poverty and Human Development Initiative
PAC	Project Affected Community
PAP	Project Affected Person
PM	Particulate Matter
PNAAC	National Climate Change Adaptation Plan
PNE	National Emissions Plan
PPE	Personal Protective Equipment
PRODEL	“Empresa Pública de Produção de Electricidade”
PS	Performance Standard
PV	Photovoltaic
RAI	Regional Area of Influence
RAP	Resettlement Action Plan
RCP	Representative Concentration Pathways
REPTUR	General Regulation on the Territorial, Urbanistic and Rural Plans
RNT	Rede Nacional de Transporte de Electricidade
RPF	Resettlement Policy Framework

Abbreviation	Definition
RTE	Round Trip Efficiencies
RTT	Resettlement Task Team
SADC	South African Development Community
SAPP CC	Southern African Power Pool Co-ordination Centre
SCC	Social Cost of Carbon
SDG	Sustainable Development Goal
SEP	Stakeholder Engagement Plan
SFDRR	Sendai Framework for Disaster Risk Reduction
SFP	Strategy to Fight Poverty
SMHI	Swedish Meteorological Hydrological Institute
SPI	Standardised Precipitation Index
STD	Sexually-Transmitted Disease
SR	Scoping Report
SWAPO	South-West Africa People’s Organization
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TB	Tuberculosis
ToR	Terms of Reference
TSS	Total Suspended Solids
TURH	Titles of Use of Water Resources
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNITA	National Union for the Total Independence of Angola
USD	United States Dollar
UXO	Unexploded Ordinance
VAC	Visual Absorption Capacity
VG	Vulnerable Group
VGP	Vulnerable Groups Plan
Vul	Vulnerable Species
W	Watts
WB	World Bank
WCDRR	World Conference on Disaster Risk Reduction
WHO	World Health Organisation
WWTP	Waste Water Treatment Plant

1 Introduction

The Southern African Power Pool Co-ordination Centre (SAPP CC) has appointed Aurecon South Africa (Pty) Ltd (“Aurecon”) to conduct the Environmental and Social Impact Assessment (ESIA) process for the ANNA Transmission Interconnection Project.

The Environmental and Social Impact Assessment (ESIA)[1] documentation for the Angolan portion of the Angola-Namibia Transmission Interconnector Project (ANNA) is divided into three volumes: Volume I is the Non-Technical Summary (NTS), Volume II comprises the ESIA Report, and Volume III constitutes the Environmental and Social Management Plan (ESMP). Separate ESIA documentation has been compiled for the Namibian part of the line.

This Stakeholder Engagement Plan (SEP) forms part of the ESMP, as Annexure A, and provides an overview of the stakeholder engagement process, legal requirements, as well as the stakeholder engagement tasks completed and outstanding for the project lifecycle in Angola.

1.1 Project overview

The project is co-ordinated by the Southern African Power Pool (SAPP) and has, as Project Sponsors/Proponents, Rede Nacional de Transporte de Electricidade (RNT) in Angola, and NamPower in Namibia.

The Southern African Power Pool (SAPP) co-ordinates the planning, generation and transmission of electricity on behalf of member state utilities in the Southern African Development Community (SADC) region. As such, SAPP has identified the Angola-Namibia (ANNA) Transmission Interconnector Project as one of its key energy pool initiatives.

The aim of the project is to alleviate the current electricity supply constraints and to contribute towards the security of energy supply by enhancing the distribution of electricity in the region. From its conception, the ANNA project has had the objective of promoting the highest positive economic, social and environmental impact possible whilst ensuring that all negative social and environmental impacts are addressed by avoiding negative impacts, or where they can’t be avoided, minimising and compensating over and above the estimated impacts. This philosophy aims to ensure that the project attains a net positive social and environmental impact and contributes to the overall sustainable development of Angola and Namibia. These considerations were included in the initial conception of the project by means of selecting a route for the transmission line corridor that would avoid all identified sensitive environmental and social resources, as much as possible, as explained in Section 2.10 of the ESIA Report (Volume II).

The project is intended to link the Namibian and Angolan electricity networks in the north-western part of Namibia and in the southern part of Angola, initially supplying power to towns in the southern part of Angola, mainly Xangongo, Cahama and Ondjiva, as well as to provide for the future integration of 400 Kilovolt (kV) line(s) from the proposed Baynes Power Station[2]. Anticipated economic benefits include unlocking cheaper energy generation sources across the region, improved access to renewable energy sources (with lower emissions), reduced cost of transmission (due to an increase in transmission route options) and a reduced risk of supply interruptions to both countries. These objectives combined contribute towards the United Nations Development Programme (UNDP) Sustainable Development Goals (SDGs), as discussed in Section 3.3.4 of the ESIA Report (Volume II) and demonstrates progress towards the additional objective of climate co-benefits. The project design also included the applicable mitigation and adaptation measures, in order to minimise its vulnerability to climate change and increase its resilience.

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[1] Although referred to as an ESIA process internationally, the terminology used in the Angolan legislation is Environmental Impact Assessment (EIA) process and, in order to maintain consistency throughout this report, the term ESIA process will be used.

[2] Planned on the Kunene River downstream of Ruacana.

The project is funded by the European Union (EU) and the funds are administered by the Development Bank of Southern Africa (DBSA). An ESIA process is required to meet the international lender standards for environmentally and socially sustainable development, and to meet national legal requirements. The separate ESIAs being undertaken for both the Namibian and Angolan sections of the proposed project, are aligned with the DBSA Environmental and Social Safeguards Standards (closely linked to the Performance Standards of the International Finance Corporation - IFC) and with country-specific legal requirements.

The procedure for the ESIA of the project in Angola will comply with local requirements, namely: Environmental Framework Law (Law no. 5/98, of 19 July); Environmental Impact Assessment (Decree no. 51/04, of 23 July); Environmental Licensing Process (Decree no. 59/07, of 13 July) and further auxiliary legislation, as summarised in Section 2.1.

In Angola, the ESIA process is initiated with a project registration stage that includes a screening phase in which the project's characteristics are assessed to evaluate whether it is included in the list of activities that require an Environmental Licence, prior to the issue of any other licence. As per legal requirement in Angola, following this stage, the EIA report is submitted to the Impact Assessment Authority (DNPAIA[1]) within the Environmental Ministry (MINAMB[2]) for consideration and approval. In Angola, the scoping phase is not included in the ESIA process. However, international best practice indicates that this stage of the ESIA process forms a crucial part of stakeholder engagement, as well as helping to promote the mitigation of potential negative impacts, and the enhancement of expected positive project outcomes and, as such, this step was included.

The proposed project is a 400 kV overhead transmission line, with a total length of approximately 362 km, extending from the proposed Kunene substation in Namibia, to the proposed Lubango substation in Angola, of which 331 km will be located in southern Angola, with the remaining 31 km in Namibia (Figure 1.1). The project is currently in its concept design phase. The ESIA applications seek approval of a 2 km wide corridor for this length (1 km on either side of the centreline of the proposed line), referred to as 'the study area'. The transmission line servitude, with a maximum width of 55 m, and within which the transmission line will be constructed, will be located within this 2 km wide corridor. It is estimated that a 12 m width within the servitude will need to be totally cleared of vegetation and obstacles so as to create a service road and to ensure that the line has sufficient clearance from vegetation.

The transmission line in Angola starts at the proposed Lubango substation, north-east of the town of Lubango, from where it runs east for ± 6.5 km and then turns south-east for ± 65 km. The route then heads south-southwest, bypassing the Bicuar National Park, and runs for ± 93 km until it meets the Lubango-Cahama road, near Capanda, and follows its course for approximately 35.5 km until the line reaches Cahama. Near Cahama the line turns in a westerly direction until it reaches the proposed Cahama substation. After the Cahama substation, the transmission line runs in a south-easterly direction for ± 91 km and then south-west for another ± 40 km, whereafter it reaches the Namibian border.

The proposed stretch of transmission line in Namibia is expected to run parallel with, and to the east of, the existing 330 kV transmission line, which extends from Omburu to Ruacana, as well as the existing 66 kV transmission line that runs north from Ruacana. The proposed 400 kV line would be offset by 60 m from these existing lines.

Geographically located in southern Angola, the project spans the Municipalities of Lubango, Chibia, Gambos, Cahama, Curoca and Ombadja, occupying an area of 46 457 km^2.

The first three municipalities, Lubango, Chibia and Gambos, are part of the 14 municipalities in the province of Huila, the capital of which is located in the Municipality of Lubango. The remaining municipalities, Cahama, Curoca and Ombadja, belong to the 6 municipalities that comprise the Cunene province, the capital of which, Ondjiva, is located in the municipality of Cuanhama.

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[1] Direcção Nacional de Prevenção e Avaliação de Impactes Ambientais - National Director for Prevention and Assessment of Environmental Impacts

[2] Ministério do Ambiente

Figure 1.1: Preferred transmission interconnection route from the proposed Kunene substation (Namibia) to Lubango (Angola)

1.2 Aims and objectives of Stakeholder Engagement

In order to appropriately and fully incorporate social considerations, a Stakeholder Engagement Plan (SEP) was prepared, as per the requirements of the DBSA Environmental and Social Safeguards (ESSS - 2018), the International Finance Corporation's (IFC) Performance Standards (PS - 2012) and the World Bank Environmental and Social Framework (2017).

As the project is proposed to be developed in two countries, Angola and Namibia, and separate ESIA documentation was compiled for each of the two countries, independent SEPs have also been prepared. This SEP applies to the Angolan component and provides the platform for SAPP and the utility (RNT), as the operational and implementation lead for stakeholder engagement, to consult with the potentially-affected stakeholders and communities, to identify and address any issues or concerns of the Project Affected Persons (PAPs), stakeholders and community that may arise as a result of the implementation of the project. It further provides a mechanism to allow for ongoing stakeholder engagement and grievance management throughout the project lifecycle, and in line with international best practice. This SEP therefore provides a framework for the engagement process and must be considered a dynamic document to be updated continuously throughout the lifecycle of the project in order to adapt to conditions on the site, or to meet the needs of the PAPs, stakeholders and communities, as these changes become evident.

In terms of the DBSA and IFC requirements, it is important to start with stakeholder engagement during the initial phases of project planning so as to fully incorporate the stakeholders' concerns, issues and questions into the ESIA process, so that it may inform project design and planning and ensure access to local knowledge. Stakeholder engagement must be continued throughout the project lifecycle to ensure the project's success, including the ESIA process (with the initial engagement followed by engagement regarding the findings documented in the Scoping and ESIA Reports). During construction, stakeholder engagement will be undertaken by the contractor/s on behalf of the utility and, during operation, by RNT.

Stakeholder engagement has been described by the IFC as a broad, inclusive and continuous process of communication between an organisation and those potentially impacted by the activities of the organisation. It can include a wide range of activities which is relevant to the entire life of a project. It can also refer to interested parties, such as conservation agencies with an interest in protecting global biodiversity habitats and species including bird migration routes, those who are interested in safeguarding a region's resilience against climate change impacts, agencies interested in promoting cultural heritage, or pride and gender equality though responsible tourism.

It is recognised that there are significant reputational risks for an organisation that result from poor stakeholder relationships. Corporate social responsibility, transparency and reporting are increasing in importance, and good stakeholder relationships are a prerequisite for good risk management (IFC, 2007).

The aim of stakeholder engagement differs at different stages of the project lifecycle. At the ESIA stage, the aim is to provide an opportunity for PAPs, stakeholders and communities to be informed of projects occurring in their area that may affect them directly or indirectly, and to provide an accessible and meaningful opportunity for people to ask questions, raise concerns or grievances. Furthermore, it aims to ensure that these are used to guide new development, and ongoing operations, in a responsible manner that complements the local socio-economic environment and enhances the benefit of a particular project. Early stakeholder engagement also provides an opportunity for local communities to provide insights on the environment.

This project will contribute to a business environment that reduces risk and promotes economic and environmental resilience. The IFC Performance Standard 1 (IFC, 2012) states the objectives as:

- To ensure that grievances from Affected Communities (PAPs) and external communications from other stakeholders are responded to and managed appropriately; and
- To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.

Companies and state-owned enterprises seeking to undertake effective stakeholder engagement should consider the following guiding principles, as shown in Figure 1.2 (IFC, 2010, p. 39).

Accessibility

- Disclose information to all stakeholders in an accessible way. In particular, technical information should be communicated in an accessible format and in the language spoken by the stakeholders. Interaction should also be conducted in a culturally-sensitive way.

Inclusivity

- Ensure that any stakeholder engagement is culturully-appropriate, and specifically, gender-inclusive. It should explicitly seek out the views of any vulnerable groups that may be adversely affected by the business activity.

Transparency

- Ensure that they keep legitimate stakeholders abreast of any plans, developments and alterations. In particular, companies should notify stakeholders of any decisions arising from the feedback that specifically address raised concerns.

Figure 1.2: Guiding principles for effective stakeholder engagement

1.3 Stakeholders

For the purposes of this report, stakeholders are regarded as synonymous with 'Interested and Affected Parties' or Project Affected Persons (PAPs). According to DBSA ESS Standard 2, the term 'stakeholder' is used to refer to:

- *Project beneficiaries - those who will benefit directly from the project.*
- *Project-affected persons - those who are affected, or who are likely to be affected, but who are not project beneficiaries.*
- *Other interested parties - those who may have an interest(s) in the project.*

PAPs are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or have the ability to influence its outcome, either positively or negatively. Stakeholders may include locally-affected communities or individuals, and their formal and informal representatives, national or local government authorities, politicians, religious leaders, civil society organisations and groups with special interests, the academic community, or other businesses (IFC, 2007). Of importance in Angola, are the communities potentially affected by this project along the alignment (Figure 1.1). Other stakeholders include those not physically affected by the project, such as those with interests in conservation, energy, cultural heritage, etc.

1.4 Scope of work

The scope of this SEP is applicable to the entire project lifecycle, but focussing on the ESIA phase as the current project stage. It lays down a basis for how stakeholders can engage with the Proponent, but must be regarded as a dynamic document post-ESIA process. It is the responsibility of RNT to update this SEP as the needs of its stakeholders evolve over time (Figure 1.3). The utility is ultimately responsible for implementing stakeholder engagement during the construction and operational phase, as defined in the SEP.

Stakeholder engagement is integral to the ESIA process and is a legal requirement. Furthermore, to meet the DBSA and IFC requirements, intensive stakeholder engagement is a prerequisite.

The IFC Performance Standards (PS) apply to all project activities supported by the IFC. The requirements section of each PS applies to all activities financed under the project, unless otherwise noted in the specific limitations. Proponents are encouraged to apply the Environmental and Social Management System (ESMS), developed under PS 1, to all their project activities, regardless of financing source. A number of cross-cutting topics, such as climate change, gender, human rights, water and indigenous peoples, are addressed across multiple Performance Standards (IFC, 2012).

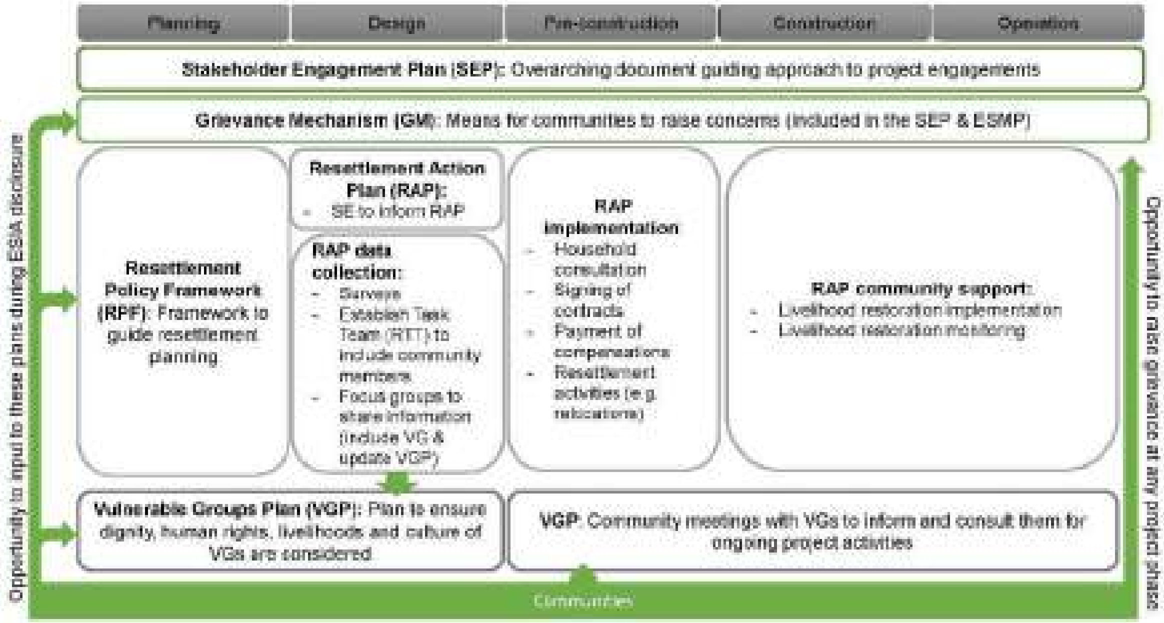


Figure 1.3: Stakeholder engagement components

The IFC PS 1 also establishes the importance of: (i) integrated assessment to identify the social and environmental impacts, risks, and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) the management of social and environmental performance throughout the life of the project. The SEP satisfies the requirements of the IFC PS1 Guidance Notes, in the following way:

- It describes regulatory, lender, company, and/or other requirements for consultation and disclosure;
- It identifies and prioritises key stakeholder groups, focussing on Affected Communities;
- It provides a strategy and timing schedule for sharing information and consulting with each of these groups; and
- It describes resources and responsibilities for implementation of stakeholder engagement activities. IFC PS 1 also stipulates that stakeholder consultation should include elements of capacity-building to ensure that the process is considered "free, prior and informed". This will be done by:
  - Providing accessible and adequate information without creating undue fears (related to potential negative impacts) or expectations (regarding employment opportunities);
  - Including illustrations and verbal explanations for illiterate stakeholders; and
  - Using local languages and small groups to ensure stakeholders do not feel intimidated.

Consultation will provide vulnerable groups equal opportunities to participate by:

- Making a concerted effort to identify disadvantaged or vulnerable groups; and
- Providing transportation and/or subsidies for the vulnerable poor, if required, to ensure their participation does not come at the expense of their livelihoods.

The SEP also takes into consideration the guiding principles in the DBSA Environmental and Social Standard (ESSS) 2: Stakeholder Engagement and Information Disclosure. In line with ESSS 2 the project strives to engage stakeholders throughout the project lifecycle. The nature, scope and frequency of stakeholder engagement for the ANNA project were informed by the project's nature, scale, potential risks and associated impacts.

2 Legal framework and requirements

Consultation and stakeholder engagement will be undertaken in line with Angolan environmental legislation, alongside other international standards and best practice, as discussed above. The legal framework thus includes, but is not limited to, the legal documents identified below.

- Regulations for Public Consultation for projects subjected to EIA process (Executive Decree no. 87/12, of 24 February);
- DBSA ESSS2: Stakeholder Engagement and Information Disclosure;
- DBSA ESSS3: Gender Mainstreaming;
- DBSA ESSS4: Indigenous Peoples;
- DBSA ESSS7: Community Health and Safety;
- IFC PS1: Assessment and Management of Environmental and Social Risks and Impacts;
- IFC PS4: Community Health, Safety and Security;
- IFC PS7: Indigenous Peoples;
- IFC (2007): Manual Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets; and
- SAPP (2018b): Final Environmental and Social Management Framework for the Southern African Power Pool.

2.1 Angolan legal framework

The ESIA process will be undertaken in line with Angolan environmental legislation, as well as with other international standards and regulations, as reflected above.

The legal document most relevant to the development of this SEP, are the **Regulations for Public Consultation for projects subjected to an EIA process** (Executive Decree no. 87/12 of 24 February), that states that DNPAIA is the entity responsible for an EIA's public participation, after the EIA report has been submitted to the authorities for evaluation. The objectives of these regulations include ensuring that the project information is released to the public and that public opinion, on all relevant aspects of the project activities, is gathered (Article 3). Article 4 states that public consultation is undertaken by means of a public session, at which a panel is present, composed of a chairperson, who represents the DNPAIA, a secretary, and a rapporteur, who is responsible for conducting, registering and documenting the public session (Article 4). The disclosure of the public session is MINAMB's responsibility (Article 7), and the terms and documentation, namely the Non-Technical Summary, to be released for this session, are explained in Article 8. The timeframes for public consultation/comment may not be shorter than five days, or more than 10 days (Article 9). Public participation during the public session may be verbal or written (Article 11) and all questions raised must be addressed orally during the session (Article 12). The minutes of the public session are prepared by the secretary, and reviewed and approved by the chairperson and the rapporteur, and serve as a basis for the technical advice for the environmental liaison process (Article 13). The project's proponent is responsible for all costs associated with the public consultation (Article 16).

The legal framework pertaining to the development of the ESIA documentation includes, but is not limited to, the legal documents identified in Table 2.1 below.

Table 2.1: List of relevant regulations at national level

Legal Document
Environment
Law no. 5/98, of 19 June, Environmental Framework Law
Decree no. 59/2007, of 13 July, Decree on Environmental Licencing Process
Decree no. 51/2004, of 23 July, Regulation on the Environmental Impact Assessment (EIA) process
Executive Decree no. 86/12, of 23 February, Regulation on the Technical Registration for Environmental Consulting Societies/Companies
Decree no. 302/2016, of 30 June, Regulation on the Classification of Environmental Consulting and Auditing Societies/Companies
Executive Decree no. 92/12, of 1 March, Terms of Reference (ToR) for the Environmental Impact Assessment Report/Study
Executive Decree no. 87/12, of 24 February, Regulations for Public Consultation for projects subjected to EIA process
Joint Executive Decree no. 96/09, of 6 October, approves the taxes applicable to the EIA process
Decree no. 1/10, of 13 January, on Environmental Auditing
Presidential Decree no. 194/11, of 7 July, on Environmental Damage Liability
Energy
Law no. 14-A/96, of 31 May, amended by Law no. 27/15, of 14 December, General Law on Electricity
Decree no. 47/01, of 20 July, Regulations for Energy Production
Presidential Decree no. 256/11, of 29 September, approving the National Policy and Strategy for Energy Security
Land Use and Regional Planning
Law no. 3/04, of 25 June, Law on Territorial and Urban planning
Law no. 9/04, of 9 November, Land Law
Decree no. 2/06, of 23 January, General regulation on the Territorial, urbanistic and rural plans (REPTUR)
Presidential Decree No. 216/11, of 8 August, National Policy for Land Concession Rights
Law no. 1/11, of 14 January, Basic General Regime of the National Planning System
Presidential Decree no. 214/15, of 08 December, approving the National Strategic Plan for Territorial Management (PLANEAT) 2015-2025
Water
Law no. 6/02, of 21 June, Water Law
Presidential Decree no. 261/11, of 6 October, Regulation on Water Quality
Presidential Decree no. 141/12, of 21 June, Regulation for the prevention and control of pollution in national waters
National Health Development Plan 2012-2025
Presidential Decree No. 9/13, of 31 January, approving the National Water Strategic Programme (PNEA) for the period 2013-2017
Presidential Decree No. 82/14, of 21 April, Regulation of General Use of Water Resources
Presidential Decree No. 126/17, of 13 June, National Water Plan
Waste Management
Presidential Decree no. 190/12, of 24 August, Regulation on Waste Management
Executive Decree no. 17/13, of 22 January, on the waste management of residues resulting from building and demolition activities
Flora, Fauna and Conservation Areas
Resolution no. 42/06, of 26 July, National Strategy and Cation Plan for Biodiversity
Resolution no 1/10, of 14 January, National Policy on Forests, Wildlife and Conservation areas
Presidential Decree no. 46/14, of 25 February, approving the National Action Programme to fight Desertification (PANCOD)

Legal Document
Resolution No. 27/16, of 22 July, implementing the Convention on Wetlands
Executive Decree no. 433/16, of 26 October, validating the Certificate of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
Law no. 6/17, of 24 January, Forest and Wildlife Law
Executive Decree no. 252/18, of 13 July, approves the Red List of Species for Angola
Presidential Decree no. 171/18, of 23 July, Forestry Regulation
Heritage
Law no. 14/05, of 7 October, Cultural Heritage Law
Decree no. 2/06, of 23 January, on the Architectural and Archaeological Patrimony
Social Issues and Protection of Vulnerable Groups
Resolution no. 9/04, of 4 June, National Strategy for Combating Poverty
Presidential Decree no. 222/13, of 24 December, on the National Policy for Gender Equality and Equity
Law no. 25/12, of 22 August, Child Protection and Integral Development Framework Law
Presidential Decree no. 158/18, of 29 June, approves the National Development Plan 2018-2022
Indigenous People
There are no specific references to indigenous peoples or minorities in the Constitution, nor in other domestic law. The Government of Angola does not recognise the concept of indigenous peoples, as is affirmed in international law. Despite this, Angola has been a signatory to International Labour Organisation (ILO) Convention 107 on Indigenous and Tribal Populations since 1976, albeit with very limited reporting[1].

2.2 IFC and DBSA requirements

The most relevant of the IFC PS and DBSA ESSS are shown in Table 2.2, which includes the respective objectives. These frame the activities proposed in the SEP. Note that resettlement components are addressed in the Resettlement Policy Framework (RPF - Annexure C of the ESMP Vol. III)) and not included below.

Table 2.2: IFC and DBSA Standards

Standard	Objectives
IFC PS1: Assessment and management of environmental and social risks and impacts	• Ensure that grievances from Affected Communities, and external communications from other stakeholders, are responded to and managed appropriately. • Promote and provide means for adequate engagement with Affected Communities throughout the project lifecycle on issues that could potentially affect them, and ensure that relevant environmental and social information is disclosed and disseminated.
DBSA ESSS2: Stakeholder engagement and information disclosure	• Establish a systematic and inclusive approach to stakeholder engagement to build and maintain a constructive relationship with project beneficiaries and project affected parties throughout the project lifecycle. • Create an enabling environment that allows project beneficiaries and project-affected parties to exercise their rights regarding the project, and to influence project design and environmental and social performance. • Provide key stakeholders with appropriate project information on environmental and social risks and impacts in an understandable, transparent, and appropriate manner, which enables stakeholders to make informed choices. • Provide project beneficiaries and project-affected parties with an accessible and inclusive means to raise their grievances and to allow the Proponent to effectively respond to concerns raised in a comprehensive manner.

[1] (Fundo De Apoio Social (FAS), 2017)

Standard	Objectives
IFC PS7: Indigenous peoples	• Ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous People. • Anticipate and avoid adverse impacts of projects on communities of Indigenous People or, when avoidance is not possible, to minimise and/or compensate for such impacts. • Promote sustainable development benefits and opportunities for Indigenous People in a culturally-appropriate manner. • Establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with Indigenous People affected by a project, throughout the project's lifecycle. • Ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous People when the circumstances described in this Performance Standard are present. • Respect and preserve the culture, knowledge, and practices of Indigenous People.
DBSA ESSS4: Indigenous peoples	• Assist the Proponent to ensure that the development process respects Indigenous People's human rights, dignity, aspirations, culture, and natural resource-based livelihoods. • Anticipate and avoid adverse project impacts on communities of Indigenous People or, when avoidance is not possible, to minimise and/or compensate for such impacts. • Undertake full FPIC with Indigenous People where projects impact on their livelihood, land, and natural resources in a manner cognisant of their language, customs and traditions, for any investment or development throughout the project's lifecycle. • Ensure that project implementation respects indigenous knowledge, culture and practices. • Promote sustainable development benefits and opportunities for Indigenous People in a culturally-appropriate manner. • Ensure that project implementation acknowledges Indigenous People's socio-economic rights and access to services including social welfare, healthcare, education, water, electricity, housing, economic livelihoods and employment.
DBSA ESSS3: Gender mainstreaming	• Protect women's human rights and comply with international women's and human rights standards and treaties. • Increase knowledge and insights about gender and vulnerable groups (including people living with disabilities) regarding project concepts and governance. • Identify strategies to increase participation from, and representation of, women and marginalised groups in sustainable infrastructure project solutions. • Adopt due diligence practices that mainstream gender considerations into project planning and execution, thereby ensuring that projects respond to distinct gender needs and proactively address gender inequalities, including men's and women's differential access to assets, property, education, credit, and other resources. • Identify and prevent potential direct or indirect project or programme-related harm on women, men, girls and boys, including changes in livelihood or environmental degradation and sustainability. • Incorporate sex-disaggregated data into project reporting to accurately measure and assess impacts of investments on genders. • Proactively engage women and men in culturally-appropriate languages, forms and ways throughout the project lifecycle, according to FPIC principles. • Provide adequate budgeting for integrating gender empowerment into project execution plans.

3 Stakeholder engagement in the ESIA process

The following section provides a guideline of the stakeholder engagement process to be implemented in the lead-up to the commencement of construction. Note that for the successful and effective implementation of the SEP, this document must be treated as dynamic and, as such, is expected to be updated throughout the project as additional information becomes available and as new relationships are formed. The following steps describe, in further detail. the actions to be taken during the ESIA for the proposed project.

3.1 ESIA stakeholder engagement activities

To date, the public were afforded two opportunities to participate in the project, in accordance with the requirements of the international financial institution safeguards, that is during the fieldwork social engagement in April 2019 and after the finalisation of the Scoping Report, as explained further below.

3.1.1 Pre-application meeting

The objective of this task was to identify and register the key stakeholders that would directly be affected by the project, or entities that have a jurisdictional mandate governing any aspect on which the project may exert an influence. During this phase, DNPAIA, the relevant department within the Angolan Ministry of Environment (Ministério do Ambiente - MINAMB), was consulted and requested to identify other parties that should be included on the stakeholder registry. The key stakeholders, referred to as Interested and Affected Parties (I&APs), are to be continually captured in a stakeholder registry/database.

3.1.2 Stakeholder identification

The abovementioned database can also be used to identify what are termed “key stakeholders”. These include the authorities, land users, I&APs who act as sectoral representatives, and individuals who have previously expressed sentiments (positive or negative) about the project area and/or environmental processes. Land user details can only be determined upon consultation with authority structures in the area and after site visits have been conducted. Other key stakeholders identified throughout the process comprise:

- Persons residing in areas through which the transmission line traverses are primary stakeholders, as are those adjacent to the line. These stakeholders can be quickly identified if they reside in urban areas, whereas those in rural areas will have to be identified through traditional authority structures;
- Relevant NGOs, schools, religious centres, hospitals and other social infrastructure within the project area of influence;
- Indigenous people, such as the Mundimba and the San, will also need to be consulted via their authority structures;
- Businesses along the route shall also be included in the I&AP database; and
- Angolan community and private stakeholders.

The importance of including Angolan traditional authorities is illustrated in the following quote:

“*The sobas are the undoubted leaders of their village and are the key persons for any kind of state or NGO intervention on village level. When the sobas are included in the processes of planning infrastructure … the chances for success are higher. They are able to unite the village and create a high self-help potential among the villagers. If they are not involved or if they oppose a project, generally the whole village will follow and the chances for success are extremely low*.” (Kunene River Awareness Kit, n.d.)

A linear project such as this may have impacts on people beyond the immediately affected stakeholders, known as secondary stakeholders. Secondary stakeholders can be identified by means of newspaper advertisements, radio notices and word of mouth.

A preliminary I&AP database was developed through a literature review and by establishing which authorities may be considered stakeholders in the project. The database of I&APs includes governmental departments, traditional leaders, national, provincial, municipal and communal officials, and non-governmental organisations (NGOs) in the area. Numerous stakeholders reside in highly rural and remote areas. In these cases, experience has shown that traditional leaders are instrumental in the identification and involvement of stakeholders. This ongoing and up-to-date record of communication is an important requirement of the IFC for public involvement.

Preliminary stakeholder groups or institutions are outlined in Table 3.1.

Table 3.1: Preliminary stakeholder/I&AP list

Category	Stakeholder
Media	
Newspapers	Jornal de Angola
	Novo Jornal
Television	Televisão Pública de Angola (TPA) 1
	TPA 2
	TV Zimbo
Radio	Radio Nacional
	Luanda Antena Comercial
	Radio Ecclesia
NGOs	
Environmental NGOs	ADRAA - Acção para o Desenvolvimento Rural e Ambiente
	International Rivers Network
	Earthlife Africa
	World rainforest movement
	Scientific society
	Rede Ambiental Maiombe
Social development NGOs	HALO Trust (demining)
	Oxfam
	Development Workshop
	Save the Children UK
	Population Services International (PSI)
	Catholic Relief Services (CRS)
	Médecins Sans Frontèires
	HIV/AIDS Alliance
	OJDS - Organização Juvenil para o Desenvolvimento Social
	OCADEC - Organização Cristã de Apoio ao Desenvolvimento Comunitário
	GADEC - Grupo de Apoio ao Desenvolvimento Comunitário
	WIMSA - Working Group of Indigenous Minoritiesin Southern Africa
	Trocaire - Irish Catholic Agency for a Just World
	ASPALSIDA - Associação dos Serepositivos e Activistas de Luta Contra o Sida
Women's NGOs	Rede Mulher
	Promaica
	AMEH - Associação das Mulheres Empreendedoras de pequenos Negócios
	ADCESV - Acção para o Desenvolvimento e Combate para á Exclusão Social e Vulnerabilidade

Category	Stakeholder
	NHADEM - Núcleo Huilano de Apoio ao Desenvolvimento da Mulher
	IMAS – ENA - Instituto da Mulher para a Acção Social
Private sector companies	
	-
Civil organisations	
	PRESTIGIO – Youth Association of Angola
	Associação para o Desenvolvimento Rural de Angola (ADRA)
	Associacão Mãos Livres
	Associação Justiça, Paz e Democracia
	Centro MOSAIKO
	Associação de Conservação do Ambiente e Desenvolvimento Integrado Rural (ACADIR)
	Forum of the Angolan NGOs (FONGA)
	Angola Red Cross
	National Society for Human Rights
Specialised government agencies	
	Fundo de Apoio Social (FAS)
International donors	
	United Nations Development Program (UNDP)
	United Nations Educational, Scientific and Cultural Organization (UNESCO)
	United Nations Environment Program (UNEP)
	United Nations Permanent Forum on Indigenous Issues (UNPFII)
	Norwegian Agency for Development Cooperation
	Department for International Development (DfID)
	USAID
	European Union
Research institutions	
	Africa Research Institute
	Chr. Michelsen Institute (CMI)
	Southern African Institute for Environmental Assessment (SAIEA)
	Southern African Regional Universities Association (SARUA)
	Angolan National Institute of Public Health (INSP)
Political and governmental institutions	
Parliamentary committees	Permanent Joint Technical Commission (PJTC)
Political parties	National Liberation Front of Angola (Frente Nacional de Libertação de Angola – FNLA)
	National Union for the Total Independence of Angola (União Nacional para a Independência Total de Angola – UNITA)
	Popular Movement for the Liberation of Angola (Movimento Popular de Libertação de Angola -MPLA)
National governmental ministries	Ministry of Environment
	Ministry of Social Action, Family and Women’s Promotion
	Ministry of Fisheries and Sea
	Ministry of Agriculture and Forests
	Ministry of Industry
	Ministry of Telecommunications and Information Technologies
	Ministry of Territorial Planning and Housing
	Ministry of Tourism
	Ministry of Energy and Water
	Ministry of Mineral Resources and Oil
	Ministry of Culture
State-owned organisations	Bicuar National Park Administration

Category	Stakeholder
	Communal authorities and traditional structures (these can be complex and involve a variety role players)
	Angola Telecom
	Road Institute of Angola (INEA)
	National Electricity Distribution Company (ENDE)
	Civil Aerial Authority
	Military Aerial Authority
Provincial authorities	Huíla
	Cunene
Municipal authorities	Lubango
	Chibia
	Gambos
	Cahama
	Curoca
	Ombadja
Traditional authorities	Sobas grandes, sobas séculos and sobas adjuntos

3.1.3 Notification of project and ESIA disclosure

Notification

Notification about the project was undertaken by initially contacting relevant governmental institutions and having meetings with local authorities and, whenever possible, with traditional authorities. A complete list of the entities contacted and their representatives are presented in Table 3.2.

Local authorities (municipal and communal administrations) were contacted, and meetings were held to present the proposed project, identify other stakeholders, and to gain additional information on the most appropriate communication media to reach those in remote areas and to communicate with the local population and indigenous people.

These local authorities also helped in the identification of traditional authorities and assisted with establishing contact with the traditional leaders within their territory.

Traditional authority meetings were held to present the proposed project, identify other stakeholders, and to gain additional information on the most appropriate communication media to reach those in remote areas and to communicate with local population and indigenous people.

After traditional authorities had been identified, initial meetings were then arranged with them. During these engagements, the proposed project was presented, other stakeholders were identified for inclusion in the I&AP database, and further information was gathered to determine what the most appropriate communication media would be in remote areas, and for communicating with the indigenous people. The engagement with all affected local authorities will continue throughout the ESIA process

Scoping phase

A Scoping Report (SR) was compiled and a copy of this document was sent to DNPAIA[1], for information, and to Huíla and Cunene Provincial Administrations to be made available for consultation. These Provincial Administrations were also requested to send the pamphlets and participation forms mentioned below, to the concerned Municipal Administrations.

A one-page pamphlet (printed on both sides) with information concerning the project, was compiled in a non-technical format for the scoping phase, accompanied by a participation form. For each concerned municipality, 50 copies of the pamphlet and participation form were made available, to enable public disclosure of the project and the ESIA process.

[1] To date this entity has not accepted the SR as this does not form part of the Angolan ESIA process, and so DNPAIA has no mechanism in place to receive this document

Although it is recognised that these documents require a level of literacy that is not present in the study area for the majority of the population, as confirmed during the field interviews, the importance of the local community leaders/opinion-makers (such as the public servants/administrative officials, traditional leaders (Sobas and Seculos), teachers, priests/pastors, nurses, doctors, farmers of large farms, etc.) to convey and make the project and ESIA information more accessible for the majority of the population, was made clear. Engagement and collaboration with these local leaders is essential to ensure that all stages of project development are communicated to the affected communities, and they will also act as receivers and transmitters of comments and concerns to the responsible project entities (RNT, SAPP, Environmental Ministry, contractor(s) during construction, etc.).

ESIA phase

Angolan legislation on EIA Public Consultation (PC) requires the following:

*"All projects which are listed in the Annex to the EIA Decree must be subjected to a public consultation programme **organised by the Ministry of Environment**, as prescribed in Article 10 of the EIA Decree. The public consultation process, to be undertaken by the responsible Ministry, comprises the following steps:*

- *Release of the non-technical summary of the EIA Report to the interested and affected parties (as defined in Article 3 of the Decree);*
- *Consideration and appraisal of all presentations and comments relating to the proposed project;*
- *Compilation of a brief report within 8 days of the completion of the consultation period, specifying the steps taken, the level of public participation and the conclusions which may be drawn.*

The consultation process must take place over a period of five to ten days and the costs must be borne by the developer."

Therefore, the legislated PC process is organised by the Angolan Ministry of Environment. However, the Environmental and Social team must be involved as mediator and it is highly recommended that the Proponent implements this SEP over and above what is required by Angolan legislation, as per the requirements of the IFC. The Proponent must, at all times, ensure that representatives from RNT are available to assist the Ministry with technical issues raised by stakeholders.

All ESIA documentation will be made available for consultation in the Huíla and Cunene Provincial Administrations, and the non-technical summary (NTS) of the ESIA should be distributed throughout all concerned municipalities. Following the same approach applied in the scoping phase, a one-page pamphlet (printed on both sides) with information concerning the project and the ESIA process was compiled, accompanied by a participation form. These information pamphlets will be sent to the local authorities, namely the provincial, municipal and communal administrations, to be made available to those potentially concerned and/or interested.

Numerous potential I&APs reside in highly remote and rural locations. In this instance, engagement will take place primarily through meetings with the local authorities, and focal-point meetings with community and traditional leaders.

Newspaper advertisements are proposed to be placed weekly in the Jornal de Angola and the Novo Jornal (both national newspapers) to inform the public of the project and the availability of project information, for two weeks during the stakeholder engagement of the ESIA phase. Site notices will also be placed in conspicuous locations, in the populous, urban stretches of the proposed alignment corridor. The posters provide the same information as is contained in the newspaper and radio advertisements, and includes a layout map of the project.

To ensure that adequate stakeholder engagement takes place for the different stakeholder groups, three streams of engagement are proposed: (1) Engagement with authorities via post and meetings; (2) Urban area engagements utilising site notices and newspaper advertisements, as these areas are populous and have a higher contingent of literate people; and (3) Rural area engagements via community councils and traditional authority structures.

The meetings with the different stakeholders will be scheduled in advance with the relevant authorities/entities and will then be advertised via Provincial and Municipal Authorities and identified communal and traditional authorities/leaders, radio advertisements, newspaper advertisements and site notices where possible. As stated before, communication about the project is also recommended via the engagement of traditional leaders (Sobas and Seculos), and though local leaders/opinion-makers, as their level of literacy allows them to convey the report information to the general population.

3.1.4 Comment periods and meetings

Following the compilation and submission of the ESIA report to DNPAIA, a formalised comment period will commence. Notification of the availability of the ESIA documentation for review, will be done using the methods identified above. Stakeholders will be given the opportunity to express concerns and ask questions about the proposed project.

Authorities and I&APs are provided with at least 10 days to review the reports, and will be invited to submit comments in writing to the Aurecon team.

Public meetings are to be organised through the provincial, municipal, communal and traditional authorities. The format of the meeting will be tailored to the needs of the stakeholders attending the meeting. Meetings may take the format of a formal meeting via invitation, or an open house meeting at a certain time. An effort will be made to ensure focus meetings are held with vulnerable groups, such as indigenous peoples and women, so as to record their particular perceptions and concerns.

3.1.5 Reporting of stakeholder engagement issues and concerns

All comments, concerns and questions related to the project are to be recorded in a Comments and Response Report (CRR), and responses provided. Where responses may need further research, or be supplemented with additional information, responses will be provided as soon as this is available. Where necessary, an explanation will be provided of how comments will be used to revise the ESIA documentation.

Based on the CRR, a review of the ESIA documentation must be undertaken to reflect any new issues and must include the means by which these issues are to be managed, monitored and reported on. Where and if required, stakeholder reporting mechanisms should be established in the ESIA documentation to inform key stakeholder groups of progress and performance in relation to particular issues of concern throughout the project's life-cycle.

Where possible, and if there is enough information available at this stage of project development, the identified stakeholders will be mapped in a Geographical Information System (GIS). This information will support the development of future project activities, in particular the preparation of the resettlement and livelihood restoration plans (refer to Section 6 of the RPF – Annexure C of the ESMP (Vol. III)), as well as to analyse the potentially-affected I&APs.

Stakeholder engagement is an ongoing and iterative process and should continue throughout the project lifecycle. It aims to ensure that a business venture remains in touch with the community it serves, as well as with their needs and issues. It also ensures that potential impacts continue to be identified and managed in a responsible fashion, thus lowering overall business risk and improving resilience.

3.1.6 Summary of issues and concerns identified so far

In the meetings conducted during the fieldwork (in April 2019), representatives of local communities, Sobas, participated reasonably actively, although not very informed of projects of this nature. The project is generally well received and positive attitudes towards the project have been confirmed, on condition that certain associated key issues are safeguarded:

- **Involvement:** Communities should be heard when project decisions involve the allocation of land uses. Lack of access to electricity is a significant problem in the corridor, identified both by municipal and community administrations. It would thus be necessary to clearly communicate which zones will be electrified by the national grid expansion and which zones would further benefit by distribution infrastructure, and then to implement these plans. For areas not included in the national electrification plan, other compensation should be considered;
- **Compensation:** They request to at least benefit from the presence of the infrastructure in their territory, not necessarily related to electricity but rather based on the lack of water, which is their main concern (primarily due to the current drought). Construction of water infrastructure (both for supplying the communities and for livestock) can constitute a significant compensation measure for communities;
- **Communication:** They request better communication to facilitate access and the sharing of information, taking into account the linguistic differences and levels of community literacy. Direct meetings/conversations are the preferred communication means to engage people and convey information to all levels of understanding within the population. The convening of these meetings should be done directly with the Sobas, as key contacts. Written communication is a less preferred method of communication; and
- **Land occupation:** Even though there is no obvious current conflict, there is a land occupation issue between Lubango and Cahama, between cattle owners and large organised farms (fazendas). Fazendas have been occupying transhumance areas/corridors used for the seasonal movement of cattle, limiting available space and access routes to water and grazing areas. The project should therefore not place further pressure on these transhumance areas.

3.1.7 Records of Stakeholder Engagement to date

Notification meetings and interviews

During the Pre-feasibility and Screening Phase of the project and whilst stakeholders were being identified, the Angolan Ministry of Environment (Ministério do Ambiente - MINAMB) was consulted and asked which other parties should be included on the stakeholder registry.

A pre-application meeting was held with DNPAIA on 3 September 2018 with Aurecon and representatives from RNT, to introduce the project and to ensure that the ESIA process to be followed is in line with the requirements and/or expectations of MINAMB. The notes from the pre-application meeting are included in Appendix A.

Notification about the project was undertaken by initially contacting all relevant governmental institutions. Initial contacts were made with local authorities to identify traditional authorities. After traditional authorities have been identified, initial meetings were also arranged with them. During these engagements, the proposed project was presented, other stakeholders identified for inclusion in the I&AP database, and further information was gathered to determine what the most appropriate communication media would be in remote areas and to communicate with the indigenous peoples.

Fieldwork for the Social Impact Assessment (SIA) was conducted between 8 and 26 April 2019 and the main objective was to collate information about the affected area and gain a better understanding of the local social reality. This fieldwork also served as the initial Stakeholder Engagement (SE) for the ESIA process in Angola and was streamlined with the notification phase for the ESIA in Namibia. It was used to inform the way forward for the next stages of the project.

Within the scope of the SE in Angola and Namibia all relevant local authorities were contacted (Table 3.2). In these meetings the project description and objectives were introduced to the local authorities, and when possible and available, to local traditional leaders (*Sobas*). A semi-structured interview was conducted to gather information for the next stages of the ESIA process and, in the future, the Resettlement Action Plan (RAP). All interviewees were questioned on what they foresee as the best approach for future engagements and how best to connect with the local communities, thereby conveying project information in a way that is understandable to the majority of the population, especially the ones in the rural areas (where the indigenous people reside).

Table 3.2: List of entities contacted in Angola during the initial stakeholder engagement

Date	Interviewed entity	Name of representative (s)	Role
10 April '19	Huíla Provincial Government	Nuno Mahapi	Deputy administrator
10 April '19	Hoque Communal Administration Soba Hoque	Paulo Caluimbo; Jose Manuel Amuciça	Assistant administrator; Soba
11 April '19	Chibia Municipality	Eduardo Comena Audalo	Assistant administrator, social sector
11 April '19	Capunda-Cavilongo Communal Administration	Jaime Federico	Administrator
12 April '19	Gambos Municipality	Julieta Vitoria Casseça; Fernando Manuel	Assistant administrator economic and social sector; Assistant administrator, financial sector
13 April '19	Hoque Inhabitant	Bernardo	Inhabitant
14 April '19	Cahila Inhabitants	José Viçaca (Tristeza); Beto Amaral	Inhabitants (representatives of civil defence)
14 April '19	Soba Chimbolelo settlement	Mulango Katiko	*Soba*
15 April '19	Chimbemba Communal Administration	Antonio Chipinga	Administrator
15 April '19	Cahama Municipality Administration	Lurdes Maçedo de Oliveira	Administrator
15 April '19	Cahama Communal Administration Soba Cahama	Daniel Eusebio; Moises Veranda	Administrator *Soba*
16 April '19	Otchinjau Communal Administration	David Calaungela; Beto Fernando	Economic section; Community organisation
16 April '19	Soba Matatona	Muamapi Cuatcienda	*Soba*
16 April '19	Ombadja Municipality	Albertina José; Venancio Miguel Dias; Adam Jambu; Reino Toxas	Administrator; Chief political section; Chief technical section; Chief secretary/administrative
17 April '19	Naulila Communal Administration	Colmincil Elisando Santos (Kid)	Administrator
22 April '19	Humbe Communal Administration	Aguinaldo Cauna; Wilson Pinto; Feliciano Lonato	Head of technical department; Head office administrator; Soba secretary
23 April '19	Cahama Air Force Base	Neves Cachimbanba	Commander of the Air Force Base
23 April '19	Cahama Municipality Administration	Nicolau	Assistant Administrator, Finance
24 April '19	Quihita Communal Administration	Alfredo Moreno; Paulo Pianbundo; Ana Daniel	Administrator; Chief secretary; Assistant administrator

Date	Interviewed entity	Name of representative (s)	Role
25 April '19	Lubango Municipality	Armando Baptista de Santos Vieira	Administrator
26 April '19	Sobas Quihita	Joaquissimo Samba	*Soba Grande*

These meetings and interviews focused on traditional leaders in the potentially affected communities (referred to as *Soba* and *Soba Grande* for the leaders of several *Sobas*). The aim was to get a sense of how each level of stakeholder perceives and communicates information and how it is perceived within the different hierarchy levels. This was particularly important as stakeholders have little experience in these kinds of projects.

It was established that the information channels in Angola are as follows (Figure 3.1):

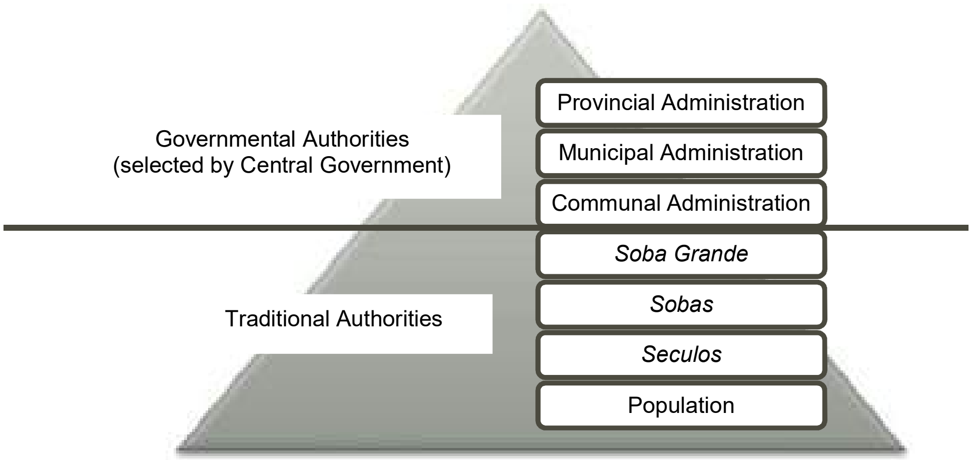
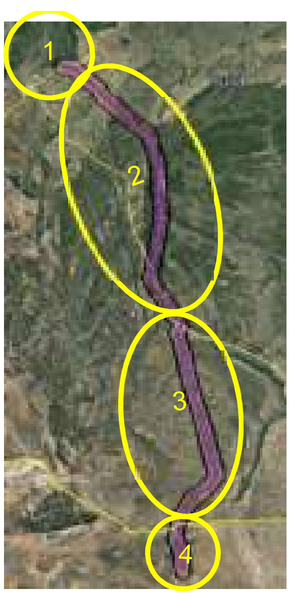


Figure 3.1: Hierarchy of information channels in Angola

From a social perspective, the corridor can be split into four main areas, based on the variations in social characteristics (Figure 3.2):



1. Angolan urban and semi-urban areas, predominantly around Lubango.
2. Woodlands, large farms, subsistence agriculture and cattle farming, and small industry zones (quarries), between Lubango and Cahama.
3. Semi-desert zone south of Cahama, with woodlands and subsistence agriculture and cattle farming.
4. Namibian semi-desert mountains and plains declared as a community conservancy, which includes villages.

Figure 3.2: Social zones along the corridorAccording to initial stakeholder engagement, considerations for future engagements include:

- The project is generally well received by the official administrative authorities. However, they request that the community benefit from it, or at least from the presence of such large infrastructure in their territory. Lack of access to electricity is a significant problem in the corridor, identified both by municipalities and community administrations. In Angola therefore it would be necessary to clearly communicate which zones will be electrified by the national grid expansion and which zones would further benefit from distribution infrastructure, and then to implement these plans. For areas not included in the national electrification plan, other forms of compensation should be considered (e.g. small-scale solar systems).
- The project is also well received by local communities and traditional authorities, who also request to benefit from the project, not necessarily related to electricity provision, but rather related to the lack of water, which is their main concern (primarily due to the current drought). Water infrastructure could be a significant form of compensation for communities, while local employment and other infrastructure was also requested.
- In Angola, there is a difference in understanding of local problems and challenges between the official administrative authorities (provincial and communal administration) and the rural communities. Administrations seem to lack clear knowledge of remote areas, and communities feel isolated (poor communication). This is important to be considered so as to involve and engage communities directly in further stages of the ESIA process, as well as later in project implementation, and not to only rely on communication through the official administrations.
- All stakeholders prefer direct meetings, considering it the most effective way to engage people and convey information to all levels of understanding within the population.
- Stakeholders have little experience with similar projects and do not seem familiar with the impacts and consequences associated with transmission line construction.
- Even though there is no obvious current conflict, there is a land occupation issue in the region between Lubango and Cahama, between cattle owners and large organised farms (*fazendas*). *Fazendas* have been occupying transhumance areas/corridors, used for the seasonal movement of cattle, thereby reducing available space and encroaching on routes to water and grazing areas. The project should therefore not place further pressure on these transhumance areas.
- In the same area (between Lubango and Cahama) there is a small-scale industrial activity (usually small-scale mining for ornamental granite in quarries) adjacent to the main road.
- Apart from small cemeteries, usually located adjacent to villages, the only special site mentioned by locals, is a sacred stone (*"emanha ocusso"*) located north of Cahama and east of the main road (Figure 3.3).

Figure 3.3: ***"Emanha ocusso"*** **– Pedra Vermelha Sagrada (red stone)**

- The indigenous ethnic groups are the Mundimbas (Herero) and the San (Khoi-San), present in the Huila and Cunene provinces. Of note in this region are also the Mumuilas (*Nyaneka-nkhumb* group, ethnolinguistic "Bantu" family) who also strongly preserve their traditions (in all cases more obvious in women than in men, due to their use of traditional attire). The rural areas have a high predominance of traditional communities and, as per information gathered in the interviews, the different ethnic groups are often mixed, and can live in the same settlement and work for the same cattle owner.

Mumuila Woman

Muhimba Women

San Woman[1]

Figure 3.4: Some of the ethnolinguistic groups present in the project area

A noteworthy fact is that the Namibian component of the ANNA Project has already undertaken a set of stakeholder engagements as part of its legal ESIA process, and some pertinent issues were raised, which have also been considered in the project implementation for Angola. These reported issues, as discussed below, refer to gender and social matters relating to vulnerabilities and should be taken into consideration for future stakeholder engagement activities during the next project stages.

- The overall region presents high levels of unemployment and a lack of skills. A dedicated training programme, to ensure that the local population are enabled, must be implemented. Tailored technical assistance for women and other vulnerable groups, including the acquisition of the specialised technical skills required for this project, must be catered for. Project activities, such as the RAP survey, should employ and capacitate locals to fulfil the specific needs of these activities.
- Create awareness in both men and women, on how they can benefit from the project in order to become economically empowered.
- Corruption and nepotism in the allocation of jobs requires attention to ensure that no person is favoured due to their gender or ethnic group. The job allocation process must be transparent and independent. A large number of women are the heads of households, and it is therefore important for women to also benefit from project-related employment. The development of the Local Employment Plan (for the construction phase) must include:
  - The implementation of Affirmative Action as one of its requirements.
  - A defined quota stating the percentage of women and men that will be employed on the project.
  - Both women and men from the settlements along the transmission line should be given priority for low skilled jobs, and explicitly indicating, the quota for each gender.
  - A skills audit must occur before any construction activities commence, and notification of this provided via the local administrations and traditional heads, undertaken by independent consultants to ensure a transparent and independent process.
  - Special attention is required to prevent, or manage, unwanted pregnancies, especially when minors are involved:

[1] *https://vivimetaliun.wordpress.com, consulted on 2019*

- Reports of unwanted pregnancies relating to construction workers, especially when the workers are from outside the project area, reinforces the need to use local workers where available.
- An increase in teenage pregnancies caused by construction workers, who are known to target schools, can also occur and, as such, these age groups should be specifically targeted in training sessions.
- As these problems only become evident after a certain period of time, often only once construction is complete, it is frequently difficult to find and/or take action against the specific worker (e.g. underage women and women with unwanted pregnancies usually do not have any source of support, and the father should be equally accountable). Actions should be put in place to prevent these situations, as unwanted pregnancies lead to the increased vulnerability of an already-vulnerable group of people (i.e. unsupported women, who are unemployed, now have the additional burden of a child with no father, and children born with no father can be stigmatised).
- The construction camp(s) must be located away from schools and locations where women, and especially minors, often gather, such as markets, churches, etc.
- The Code of Conduct must include rules for engaging with locals, especially with underage girls. The disciplinary and legal implications for non-compliance with the Code of Conduct should be emphasised, for example dismissal or legal action if a rule is contravened (such as engaging with minors).

* The related risk of HIV/AIDS may not be accepted as a valid risk by the local communities and is sometimes associated with witchcraft practices. Dedicated awareness sessions to expand the communities' knowledge, and acceptance, of these issues, as well as increase their awareness of the risks, must be implemented.
* During construction, gender-based violence (GBV) is a possibility due to the presence of a non-local workforce and, as such, the project must ensure that all measures to prevent this are put in place. This includes the creation of an incident register, of incorporating dedicated GBV actions into the Grievance Mechanism (such as the protection of the anonymity of the victim), and making provision for the application for immediate disciplinary and legal actions to be taken upon the identification of such an occurrence. This also includes creating awareness amongst men to foster support of women who will be involved in the project, as well as about sexual harassment of both genders, including awareness of existing legal instruments on sexual harassment and rape.
* Rural populations (and specifically indigenous people), often do not send their children to school as per customary practices, and future engagement should therefore also address this issue.
* Villages are spatially dispersed and when a meeting is held, people from remote areas, and more specifically women, may not be able to travel to attend. It is therefore very important to consider and accommodate these challenges when planning engagement logistics.
* Where there are social workers and/or NGOs already operating in the area, the project should revert to their support and knowledge.
* Cultural obstacles may be encountered in the free expression of opinions, for example women may not speak in the presence of men, and may not disagree with them, or marginalised groups such as indigenous peoples or other minorities may not be able/allowed to convey their concerns. The importance of engaging separately with these groups must be considered.
* The Project should put in place measures to ensure that women contribute and benefit from the economic activities of the project. This includes the development of a Local Procurement Plan (for the construction phase) that considers how women-owned businesses will benefit from the procurement processes. This Plan should also ensure the equal and effective participation of women and men of the Procurement Board.
* The walk-down to identify sensitive resources for avoidance or compensation that is to be undertaken by social, heritage and ecology specialists, should include representatives from local communities who can advise on the locations of such resources. This will reduce impacts and also create a sense of inclusion and ownership of the process.

The CLO to be appointed, should include a female and a male, both indigenous if possible.

4 Ongoing Stakeholder Engagement

Stakeholder engagement should be ongoing, as required, during the life of the project. Continuous stakeholder engagement and stakeholder management are arguably the most important components for successful project delivery. It is therefore important that, during the construction and operational phases of the project, the relationships that were established during the ESIA phase, are maintained and that stakeholder engagement is continued. For the construction and operational phases, processes and procedures guiding stakeholder engagement and grievance management should correspond with the following workstreams (Trans Adriatic Pipline, 2016):

1. Pre-construction, in particular resettlement planning engagement.
2. Construction-focussed engagement, in particular to notify PAPs and local stakeholders of construction activities and changes to schedules.
3. Livelihood-focussed engagement, ensuring that PAPs are aware of livelihood assistance and measures that will ensure restoration of livelihoods to at least pre-project levels.
4. Making a special effort to consult with groups and individuals who might be particularly affected, such as vulnerable people and households, human rights defenders, political dissidents, women, young people, minorities, and indigenous communities (Enright, et al., 2016).
5. Outreach engagement, to continue building a long-term relationship of trust with the broader spectrum of stakeholders, and capture any concerns, ensuring that issues and risks are incorporated into project planning.
6. Participatory project monitoring, which involves stakeholders, in assessing whether mitigation measures are working as intended and identifying alternatives where there are failings.
7. Grievance management, to stay on top of issues and be responsive to grievances, as well as to monitor the effectiveness of the engagement.

The level and intensity of engagement will depend on the proximity of the stakeholder to the project, the level and significance of the impacts of the proposed project on the stakeholder, as well as the type of stakeholder.

Prior to construction, PAPs are individually pre-notified and met with personally by the team in the field to place construction landmarks and to accurately identify and confirm the land that will actually be affected by the upcoming construction works (Trans Adriatic Pipline, 2016).

4.1 Potential interventions and considerations

Stakeholder engagement should target those most likely to be affected, with a focus on impact over influence (Enright, et al., 2016). The guidelines set out in Table 4.1 should be considered during stakeholder engagement and management.

Table 4.1: Stakeholder engagement considerations

ENGAGEMENT FRAMEWORK (Stakeholder engagement is not an ad hoc process, but a planned and structured one)	
Possible interventions	**Considerations**
Define the context of participation	Complete a stakeholder mapping to determine the factors influencing stakeholder engagement. Factors to consider include economic, social, cultural, political, institutional and legal.
Identify and classify all potential stakeholders	Conduct a stakeholder analysis to determine the characteristics to consider, which are interests, resources, influences, perceptions, relationships and powers.

ENGAGEMENT FRAMEWORK (Stakeholder engagement is not an ad hoc process, but a planned and structured one)	
Develop an engagement strategy	Define the desire scales (local/national/international) and scope (policy/ program/project) and form of engagement (information/consultation/ collaboration).
Create an enabling environment	Develop an implementation plan which should determine the methods and activities selected, the responsibilities of all players, the budget, and the necessary capacity-building mechanisms and deadlines for each step.
COMMUNICATION AND OUTREACH (Stakeholder engagement involves relevant information-sharing with stakeholders)	
Possible interventions	**Considerations**
Sensitise the broader public	Initiate a media campaign to present issues at stake, or use advertisements to bring particular policies, programs and projects to the attention of the public.
Provide in-depth analysis on important issues	Use publications such as fact sheets, brochures, newsletters, and articles to provide background and technical information.
Provide first-hand exposure to project activities	Organise forums and public events (exhibitions, field visits, open-house forums, etc.)
Reach out to marginalised groups (women's groups and younger audiences)	Convey messages through art and entertainment (contests, films, concerts, FM radio broadcasts) and develop educational materials (posters, involvement in school curriculum and activities, etc.).
Develop updates and web-specific information, videos, etc. on project activities	Develop a website offering a platform for downloading and uploading project documentation, pictures and other audio-visual materials.
STAKEHOLDER CONSULTATIONS (In addition to sharing information, also collect information from stakeholders to better understand their needs and interests)	
Possible interventions	**Considerations**
Obtain contextual information	Administer surveys and questionnaires to draw from the stakeholders' knowledge and experience of the environment.
Obtain views and comments on project activities	Conduct interviews with key stakeholders to gather inputs on particular energy issues.
Gather inputs on priorities and preferences	Organise focus discussion groups to explore the stakeholders' attitudes about potential options.
COLLABORATION WITH STAKEHOLDERS (Collaboration implies that stakeholders contribute to decision-making processes, in particular regarding resettlement)	
Possible interventions	**Considerations**
Elaborate and share development plans	Set up advisory groups and task forces to map out possible solutions in programmes of actions.
Formalise framework for engaging stakeholders	Establish permanent stakeholders' forums at a local level to address transboundary issues, as necessary.
Develop stakeholders' capacities	Formulate and implement capacity-building plans to improve stakeholders' access to knowledge, skills and institutions.

(Adapted from the Nile Basin Initiative. Communication and Stakeholder Engagement Strategy 2013 – 2016)

4.2 Vulnerable Groups

Refer to Section 7 of the Vulnerable Group Plan (Annexure B of the ESMP (Vol. III)) for considerations when engaging with vulnerable stakeholders. The recommended approach is set out in Figure 4.1 below, as taken from the Plan.

VG identification

- During the final project design, the detailed social surveys, as part of the RAP, will inform the number and location of VGs that will be affected by the project. This information will serve to create a preliminary list of affected VGs. This list will be updated as a live document throughout the project implementation.

Document dissemination

- The information to be communicated will be clear, meaningful, transparent and comprehensible, to ensure access to the information. All documents submitted will be simplified and, if applicable, translated into the meaningful/appropriate language(s). Acknowledging that a VG may be illiterate, all documents will also use alternative mediums to illustrate the information, such as posters with pictures and diagrams. Document dissemination will occur at least 20 days prior to the meetings.

Notification

- Ensure that the project is communicated as widely as possible, and distribute and explain meeting notifications by direct communication with VG representatives (face-to-face). These notifications will invite VGs to become involved with the engagement process and will provide information on the following: (i) date, time and location of meetings; (ii) meetings' objectives, indicating the topics to be addressed and the speakers; (iii) where more information may be obtained about the project; (iv) how and when written comments can be submitted; and (v) opportunities for any interested party to raise issues of concern on the day of the meeting.
- In addition, other measures of media will be used as appropriate: (i) site notices placed within the project area (in Portuguese and in the meaningful/appropriate language); (ii) public notices erected in strategic areas (municipal and communal administration, markets, etc.); and (iii) radio announcements.
- Notification should occur at least 20 days prior to community meetings.

Registration

- All copies, recorded comments, dates and exact locations of actions completed will be recorded in a Stakeholder Engagement Report.

Figure 4.1: Approach to Vulnerable Group engagements

4.2.1 Indigenous Peoples

The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), the ILO Convention C107 on Indigenous and Tribal Populations Convention, 1957 (No. 107), and the IFC PS 7, provide guidance for government and private sector interaction with Indigenous Peoples (IPs). While these treaties provide an important framework and guidance for reconciliation, every country with indigenous populations has unique circumstances that require a unique way forward. Large-scale infrastructure projects could have positive and negative impacts on IPs, due to their inherent connection with the land, natural resources, proximity to project sites, or their ways of life (e.g. the San live as hunter-gatherers, staying in rudimentary shelters and moving within their ancestral territories (IWGIA, 2009)). Positive impacts could include employment creation, opportunities for education and training, local economic development such as procurement from indigenous sources, and community investment projects, whereas negative impacts may include environmental impacts, economic volatility and changes to social dynamics and well-being (Teck, 2017).

In Angola, 25 000 people, or 0.1% of Angola's population, belong to the San and Himba groups (IWGIA, 2011). In 2016, funding of smaller NGOs working with IPs, was reduced, and some organisations closed as a result. In the same year, land expropriation for tourism development, commercial logging, and national projects took place, affecting indigenous peoples' settlements. There are no specific references to IPs or minorities in the Constitution, nor in other domestic law. The Government of Angola does not recognise the concept of indigenous peoples, as affirmed in international law (FAS, 2017a).

4.2.1.1 Why engage Indigenous Peoples?

Working with indigenous communities is particularly important in terms of:

- Disclosing and appropriately communicating accurate and timely information.
- Maintaining an open dialogue, so all parties can fully understand each other's views and concerns.
- Engaging in decision-making around activities.
- Collaborating on issues of mutual interest, to allow IPs to achieve self-defined community goals that provide lasting benefits.
- Securing and maintaining a social licence to operate.
- Achieving Free, Prior and Informed Consent (FPIC) of IPs when proposing new projects.
- IPs can contribute to the development of socially-responsible, sustainable solutions, and should therefore be regarded as a priority group for engagement. For instance, road closures could affect transhumance routes of cattle or hunting practices. Engaging indigenous groups could provide insights into which routes need to stay open to allow for the continuation of their lifestyles.

4.2.1.2 Guidelines on engaging Indigenous Peoples

4.2.1.2.1 Baseline information

Baseline information is particularly important to gather and, among other things, should focus on the key characteristics of the local context (ICMM, 2015), as displayed in Figure 4.2.

Demographic information about the nature of the community in terms of **tribal identities**, **clan relationships** within the tribe and **population growth** data. This is important for monitoring changes in these characteristics during engagement and project development.	**Livelihood and subsistence data** on how the community meets its basic food and shelter needs, as well as the level of **connectivity** (if any) that the community has with the **market economy**, which should be ascertained prior to engagement.	**Land ownership and tenure** from a **legal** and **customary** perspective, as well as any contestations about tenure within clan families. Overlapping ownership claims, which should be documented through government channels, and through independent inquiry from local experts.
Information about the **ethnic composition** and relations in the area, as well as the **history** of **migration**.	**Cultural heritage** significance and association with sacred **sites,** which should be ascertained from, for example, tribal elders, who have the confidence of the community.	Current **conflicts** between local and regional **governments and indigenous communities**, and historical **grievances** with similar projects in the region.

Figure 4.2: Baseline information to be gathered

Baseline information should be compiled during the Heritage and Social Impact Assessments, livelihood and household surveys within the development of the RAP, as well as possibly during Ecological Impact Assessments. To ascertain additional information, the following broad format may be followed:

- Desktop analysis;
- Gap analysis and development of interview and/or survey questions; and
- Interviews, surveys and/or focus group meetings with community leaders and other key stakeholders within the community.

4.2.1.2.2 Engaging Indigenous Peoples

Initial engagements with IPs set the tone for subsequent engagements throughout the project. However, difficulties could arise if project representatives (ICMM, 2015):

- Enter a specific area without first seeking permission to do so;
- Do not engage broadly and fail to adequately explain what they are doing and why;
- Do not allow enough time for the community to consider a request/proposal or to make a decision; or
- Disregard, or are ignorant of, local customs.

The project Proponent can avoid many of these problems if it:

- Confers with the community at the outset on ***how they wish to be engaged;***
- Understands and respects local entry protocols as they relate to permission to enter a community and to access traditional lands;
- Commits to open and transparent communication and engagement from the beginning and has a considered approach in place;
- Conducts an initial risk analysis and impact assessment prior to entering the area and then implements controls to mitigate key risks;

- Ensures that all representatives of the Proponent (including third-party sub-contractors and agents of the Proponent) are well briefed on local customs, history and legal status, and understand the need for cultural and spiritual/religious sensitivity;
- Regularly monitors performance of engagement;
- As far as possible, strives for consistency of approach and longevity of employment of the representatives of the Proponent, to allow for relationships to be built, and trust to be maintained;
- Enlists the services of reputable advisers with sound local knowledge; and
- Has senior managers present at initial meetings wherever possible, and to meet with the traditional heads of communities, as this demonstrates respect and sets the scene for building long-term trust and relationships.

4.2.1.2.2.1 Achieving broad support from indigenous communities

Key steps to ensure that broad community support is obtained, include:

- Developing a **shared understanding** of affected IPs in terms of their culture, spirituality, organisational and decision-making structures, claims and rights to lands, values, concerns and history, including previous experiences with similar development projects (although it is understood from initial engagements that local communities have had little experience with similar projects);
- Collaboratively developing an effective means to ensure that IPs are **informed** about, and understand, the full range (short, medium and long term) of potential environmental, social and health impacts that may result from the implementation of the project. This should include the development of a "dictionary" with the IPs, to ensure that the **meaning of words** that do not feature in the indigenous language are communicated clearly. Remember that the literacy rate among Angolan San adults and youth is very low, and few San children attend school (IWGIA, 2009);
- Agree acceptable **timeframes** to make decisions throughout the lifetime of the project, taking into consideration logistics, local customs, commercial requirements and time needed to build trusting relationships. Timeframes should consider IPs' own decision-making processes and structures. Ensure that it is clear as to how the timetable for involvement links with when project decisions are made;
- Agree on the terms and conditions for the provision of any ongoing community support with affected indigenous peoples, as well as any associated reciprocal obligations;
- Record the process and decisions reached when IPs are involved, including the results of any monitoring or reviews, to provide a record for current or future generations who may be affected by the decisions, and to ensure transparency in the decision-making process; and
- Support IPs' capacity to engage in decision-making, for example by providing access to independent expert advice where appropriate, capacity building, facilitation and mediation, or involving external observers.

4.2.1.2.2.2 Approach to engagement

When engaging indigenous peoples, a people-centred approach to dialogue, that is focussed on relationships rather than issues, should be taken. Engagement topics should be centred around (Teck, 2017):

- Indigenous rights and title;
- Traditional land and resource use;
- Clear and predictable negotiation of agreements and resulting implementation;
- Water quality;
- Community investment opportunities;
- Protection of heritage sites;
- Regulatory approvals; and

- Traditional knowledge.

Key questions to ask in the initial stages of engagements with IPs include (ICMM, 2015):

1) Does the community have **existing guidelines** for conducting research?
2) Have you appropriately negotiated the **level of community participation** in the design, collection, analysis and management of the baseline study/survey?
3) Have you sought broad-based **support** from IPs at the commencement of the research process and ensured that they have given their informed consent to participate in the research activities (e.g. interview)?
4) Have you undertaken a desktop analysis of **existing information and literature** to provide context, and identified any gaps within the information?
5) Have you conducted surveys and interviews in the **local language,** with the full participation of indigenous community **representatives** (where appropriate)?
6) Have you used methodologies that **facilitate participation**, such as focus groups, “ethno-mapping” and participatory appraisal?

Representation

While the role of elders and other traditional community leaders is important, it should not automatically be assumed that those who occupy formal leadership positions, whether assigned through traditional or government structures, represent the entire community’s interest (ICMM, 2015). Sensitivity to those sections of the community who are frequently excluded from the decision-making process, such as women and young people, is key. During engagement with indigenous communities, project representatives should make it clear that they are committed to acting in an inclusive and non-discriminatory way. Company representatives should make it clear that, while they respect existing structures and will work through them wherever possible, it is important for the project representatives to understand how its activities might affect all sectors of the community. These risks could be mitigated through discussions in smaller, informal groups.

Communication

Good communication can nurture relationships with IPs. The contentious and fluid nature of much of the terminology used to refer to indigenous groups around the world requires a flexible, attentive, and respectful approach to communication. Some good rules to follow for improving communication with multicultural groups are (Hatch, 2018):

- Don’t assume you already know the correct terminology. Even if you understand specific terms, be aware that they do change and evolve over time.
- Don’t attempt to use terminology, unless you understand the meaning and origin of the term and the group it refers to.
- If in doubt, ask how an individual or group would prefer that you refer to them and their ancestry.
- If specific ancestry is not identified, the term "indigenous" is generally a respectful way to address people who identify with these groups.

It is necessary to deliver training on IPs’ rights, cultural awareness and human rights for construction, operational and management staff. This training is particularly important for those who will have extensive contact with IPs in their day-to-day roles and for other business leaders. Training could be at an awareness level, through a Cultural Awareness Orientation (Teck, 2017), since the construction phase (with the highest potential impact on IPs) is temporary. The Orientation could address the meaning of culture and cultural awareness, encourage appreciation for cultural diversity and encourage the maintenance of a safe and respectful work environment (refer to Section 6 of the ESMP - Vol. III).

Proactive engagement with government-led initiatives and existing NGOs to improve the lives of IPs could serve as conduits for continuous engagement. Examples of NGOs who have worked with San groups include WIMSA (Working Group of Indigenous Minorities in Southern Africa), Trocaire (Irish Catholic Agency for a Just World) and OCADEC Angola (Christian Organisation Supporting Community Development).

4.2.2 Gender considerations

The impacts to women were considered during the ESIA process, as women are a potentially vulnerable group due to their position in Angolan society. In addition, they chiefly rely on agriculture and livestock as their primary economic and livelihood activities (Tese, 2019) to generate an income, and protection of this resource is thus key. Women should benefit from the proposed project through community development activities and employment opportunities.

During the ESIA disclosure, a special request will be made for women to attend meetings. Where possible, a female facilitator will be included in the meetings, and smaller meetings will be held with women after community meetings (where time allows) to enable women to fully participate in the ESIA process. A meeting is also planned to be held with the regional delegation of the Ministry of Social Action, Family and Women Promotion, to record the challenges that women in the study area experience. Figure 4.3 provides an illustration of how women should be considered and included in the project's stakeholder engagement process.

4.3 Engagement after the ESIA process

After ESIA disclosure, and once the SEP is approved, the stakeholder engagement during project implementation will occur at key stages, as shown in Figure 1.3. This figure provides an overview of the relationship between stakeholder engagement and the project phases, from feasibility and project design, through construction, and into operation. Table 4.2 provides the proposed engagement approach after the ESIA process has been completed, i.e. once the project commences with implementation.

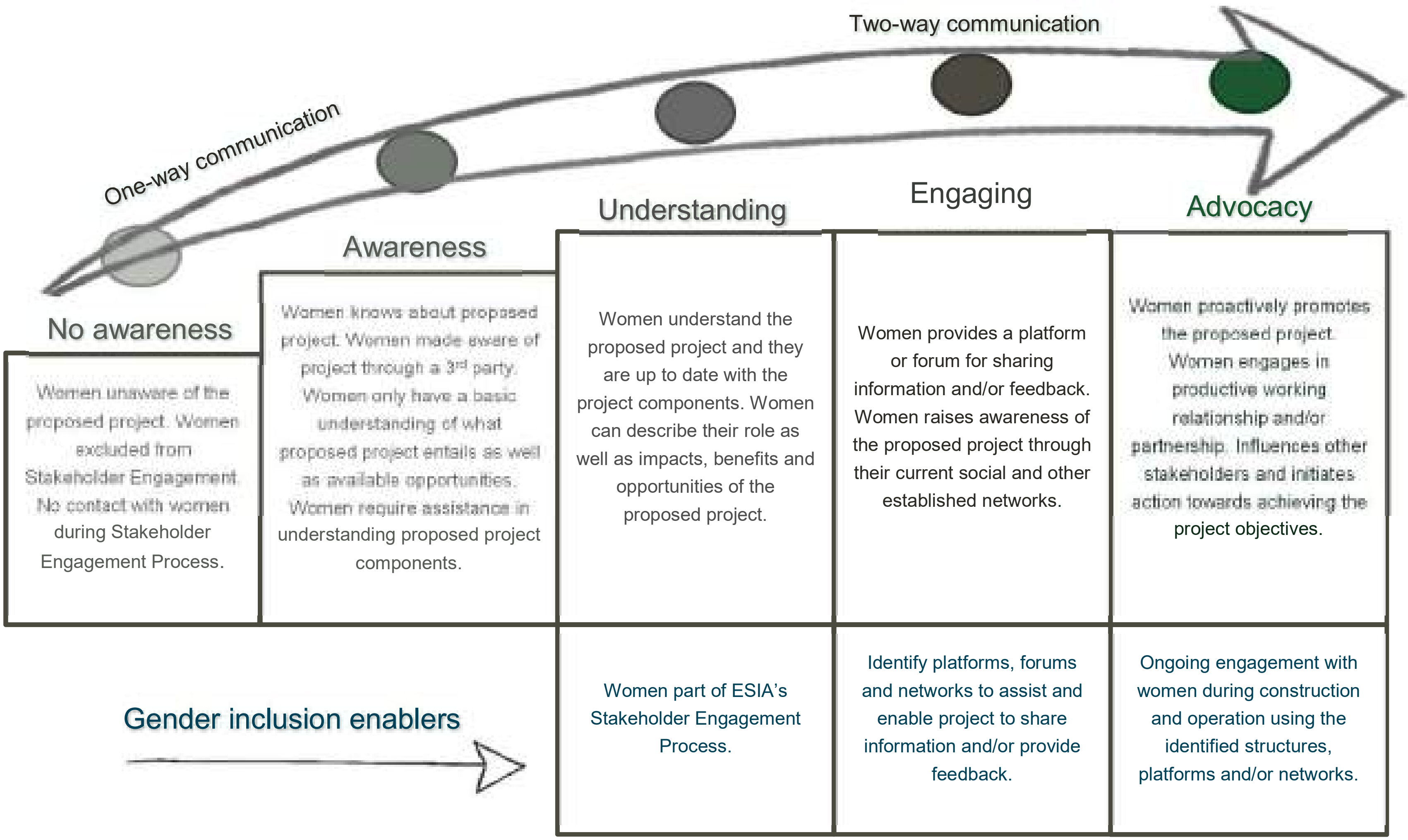


Figure 4.3: Gender considerations during stakeholder engagement

Table 4.2: Engagement proposed for the project after ESIA

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
ESIA	ESIA Report, ESMP, SEP, VGP and RPF	Community meetings	Inform, listen, and consult	• Project disclosure and impact assessment	PACs, PAPs
RAP screening	Socio-economic Baseline	Focus group meetings, Community meetings and Key Informant Interviews	Inform, listen, and consult	• Identify all people affected by the project and all adverse impacts on their livelihoods associated with the project's land acquisition. • Share information on process, schedule, etc.	PACs, PAPs
RAP planning	Draft RAP including: Thematic Maps, Compensation Framework, Detailed Budget, Implementation Schedule, Legal framework for land acquisition and compensation, Description of resettlement assistance and restoration of livelihood activities, Grievance Redress Mechanism, Framework for monitoring, evaluation, and reporting	Census, Asset and Infrastructure Surveys, Community meetings and Key Informant Interviews	Inform, listen, and consult	• Thematic maps that identify such features as population settlements, infrastructure, soil composition, natural vegetation areas, water resources, and land use patterns. • A census that enumerates the affected people and registers them according to location. • An inventory of lost and affected assets, at household, enterprise and community level. • Socio-economic surveys and studies of all affected people (including seasonal, migrant and host populations), as necessary. • Analysis of surveys and studies to establish compensation parameters, to design appropriate income restoration and sustainable development initiatives, and to identify baseline monitoring indicators. • Consultation with affected populations regarding mitigation of effects as well as development opportunities. • The RAP compensation framework specifies all forms of asset ownership or usage rights among the population affected by the project, and the project's strategy for compensating them for the partial or complete loss of those assets. The compensation framework should include a description of the following: **1** Any compensation guidelines established by the host government; **2** In the absence of established guidelines, the methodology that the project sponsor will use to valuate losses; **3** The proposed types and levels of compensation to be paid; **4** Compensation and assistance eligibility criteria; and **5** How and when compensation will be paid.	PACs, PAPs

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
				• The legal framework of a RAP describes all laws, decrees, policies and regulations relevant to the resettlement activities associated with a project. • Where displacement is unavoidable, the sponsor should plan and execute resettlement as a development initiative that provides displaced persons with opportunities to participate in planning and implementing resettlement activities, as well as to restore and improve their livelihoods. • It is essential that all costs be estimated carefully and be included in a detailed RAP budget. Without an accurate assessment of the costs of land acquisition, compensation for lost assets and physical displacement, project planners cannot determine the real cost of project design alternatives such as alternative routes for power transmission lines or alternative sites for greenfield projects. The sponsor should itemise resettlement costs by categories of impact, entitlement, and other resettlement expenditures, including training, project management and monitoring. The results should be presented in a tabular form that illustrates expenditures over the life of the project. To ensure that all adverse impacts have been taken into account, budget line items should be checked against categories of adverse impacts and entitlements. The RAP budget must include a justification of all assumptions made in calculating compensation rates and other cost estimates, and must consider both physical and cost contingencies. • The RAP budget should be linked with a detailed implementation schedule for all key resettlement and rehabilitation activities. This schedule should, in turn, be synchronised with the project's schedule of civil works construction. Timing of the RAP field activities (consultation, census and survey implementation) is crucial: commencement of field activities too soon before the project begins may raise local expectations and attract newcomers, and commencement of activities too late after the project starts may interfere with project implementation. Planners should be attentive to the agricultural and employment cycles of affected people, and avoid scheduling key resettlement activities at times that may disrupt these cycles. Linking resettlement and construction schedules ensures that project managers place key resettlement activities on the same critical path as key project construction activities. Linking schedules in this way creates an imperative for co-ordinating resettlement with other project activities throughout the chain of project management.	

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
				• The RAP must identify and provide details of the roles and responsibilities of all organisations, public or private, governmental or non-governmental, that will be responsible for resettlement activities. • Regardless of its scale, involuntary resettlement inevitably gives rise to grievances among the affected population over issues ranging from rates of compensation and eligibility criteria, to the location of resettlement sites and the quality of services at those sites. Timely redress of such grievances is vital for the satisfactory implementation of resettlement and for the completion of the project on schedule. • The RAP must provide a coherent monitoring plan that identifies the organisational responsibilities, the methodology, and the schedule for monitoring and reporting. The three components of a monitoring plan should be performance monitoring, impact monitoring and completion audit. The scope of the monitoring plan should be commensurate with the scale and complexity of the RAP.	
RAP disclosure	Public Consultation and Participation Framework, and Public consultation log	Focus group meetings, Community meetings, Key Informant Interviews	Inform, listen, and consult	• Effective resettlement planning requires regular consultation with a wide range of project stakeholders. Early consultation helps to manage public expectations concerning the impact of a project and its expected benefits. Subsequent consultations provide opportunities for the sponsor and representatives of people affected by the project to negotiate compensation packages and eligibility requirements, resettlement assistance, and the timing of resettlement activities. Project consultation with people affected by resettlement is mandatory. • Promoting Participation - The sponsor must initiate and facilitate a series of consultations with project stakeholders throughout the planning and implementation of a RAP. The purpose of these consultations is to inform stakeholders about the project and its effects, and to provide opportunities for people to voice their concerns and to propose alternatives. • Formal consultations convened by the sponsor should include sponsor representatives, project managers, relevant government authorities, representatives of concerned NGOs, and members of both displaced and host communities. Discussions should centre around the effects of the project and measures to mitigate these effects. Because of discrimination within their societies, women and members of other vulnerable groups may find it difficult to defend their interests in a public forum. For this reason, it is important for project management, or the agencies responsible for RAP planning and implementation, to employ women and members of other	PACs, PAPs

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
				vulnerable groups. These staff members can undertake outreach efforts, such as focus group consultation, to learn the concerns of vulnerable groups and convey them to resettlement planners and project managers. • The objective of these consultations should be to secure the participation of all people affected by the project in their own resettlement planning and implementation, particularly in the following areas: - Alternative project design; - Assessment of project impacts; - Resettlement strategy; - Compensation rates and eligibility for entitlements; - Choice of resettlement site and timing of relocation; - Development opportunities and initiatives; - Development of procedures for redressing grievances and resolving disputes; and - Mechanisms for monitoring and evaluation and for implementing corrective actions. • Regular consultation with affected people allows project management to monitor the adequacy and effectiveness of the RAP's compensation packages, livelihood restoration efforts, and development initiatives. • Depending on the size and scope of the project, the sponsor may employ a community liaison representative with a budget specifically for the facilitation and management of public consultation. Alternatively, the sponsor may contract a reputable and experienced NGO to provide the same services. How ever it chooses to manage information disclosure and public consultation, the sponsor must ensure that affected people have access to information about the project and the opportunities to seek redress of grievances relating to the project. • Project management must document its information disclosure and public consultation efforts. This documentation should identify who was consulted, what was discussed, and what follow-up was required.	
RAP implementation	Signed individual household dossiers, Tender documentation, Construction Management Plan and Livelihood	Community meetings, Household meetings	Negotiate, discuss and agree	• Tendering and contracting of works; • Individual household sign-off; • Resettlement construction;	PACs, PAPs

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
	Restoration Progress Report			• Participatory monitoring and oversight of the sign-off, construction and moves processes; • Moving of resettling households; • Final approvals and handover to statutory authorities; • Demolition of existing settlements; • Follow up with resettlement communities and households; and • Livelihood restoration and community development implementation, the key considerations of which are (Reddy, et al., 2015): - Replace project-affected households' existing livelihood activities as a first priority, to provide a baseline safety net to all households to ensure a minimum standard of living. - Land-for-land replacement is the most effective livelihood restoration intervention, but this can be particularly challenging where the project is acquiring large tracts of land in areas with high population densities. - Agricultural support must be provided along with replacement land in order to allow impacted households to quickly become self-sufficient in food provision again. - Skills training must begin as early as possible in the project cycle to prepare as many locals as possible for direct and indirect employment on the project. - Local employment is the highest-priority benefit for local communities and the project should put a fair and effective local employment policy and plan in place. - Local procurement for local businesses builds support for the project.	
After RAP completion (construction and/or operation)	GM report and Monitoring and Evaluation report	Regular community meetings and Grievance mechanism	Feedback from community and reporting on grievances	• Ongoing support • Publicise/broadcast the importance of the project in the long term, how people can benefit from electricity and how and when the grid will be expanded to their communities (if applicable); • Grievances are best redressed through project management, local civil administration, or other channels of mediation acceptable to all parties. Such channels of mediation may involve customary and traditional institutions of dispute resolution. The project management should make every effort to resolve grievances at the community level. Recourse to the legal system should be avoided, except as a last resort.	PACs, PAPs

5 Grievance Redress Mechanism

The IFC PS 1 states that where there are affected communities, the developer shall establish a Grievance Redress Mechanism (GRM) to receive and facilitate the resolution of concerns and grievances relating to the project's environmental and social performance. Similarly, the DBSA requires the developer to provide a GRM, process, or procedure to receive and assist the resolution of project-affected parties' concerns and grievances arising from the project. The GRM should be scaled to the potential risks and adverse impacts of the project, and have affected communities as its primary user. It should seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate and readily accessible, and at no cost and without retribution to the party that originated the issue or concern. The GRM should not impede access to judicial or administrative remedies. The developer shall inform the affected communities about the mechanism in the course of the stakeholder engagement process.

The objective of a GRM is to receive and facilitate resolution of the concerns and grievances about the project's environmental and social performance. The usefulness of a GRM is dependent on how swiftly issues can be resolved. Therefore, stakeholders must be informed of the existence of the GRM at the early stages, as well as the procedures for lodging, discussing and resolving project-related complaints. A GRM must be adapted to local social and cultural norms and must be readily accessible to all segments of the affected communities.

The GRM will be culturally appropriate, and accessible to project-impacted IPs, taking into account their access to judicial recourse and customary dispute settlement mechanisms.

The DBSA is required to monitor the Proponent's compliance with the Grievance Mechanism. The ESSS (DBSA, 2018) make provision for circumstances in which a stakeholder is unable to obtain an adequate response from a Proponent, the party may resort to following DBSA grievance procedures. They should bring their concerns directly to the DBSA's attention and, giving DBSA Management a reasonable opportunity to respond, project-affected parties may follow the process outlined in Section 5.3.

Although this mechanism is essential to implement during project construction, it is just as important that it extends into the operational phase of the project.

GRM refers to a complaint instrument through which project-affected persons and communities may raise their concerns to the project developer and find ways through which these grievances could be addressed.

The project's GRM was designed based on the following United Nations Guiding Principles on Business and Human Rights (UNGPs) effectiveness criteria for measuring its utility and performance:

- **Legitimate:** Enabling trust from the stakeholder groups for whose use they are intended and being accountable for the fair conduct of grievance processes. The GRM will be credible in the eyes of its intended users, for people to trust and use it. Users should have confidence that if they lodge a complaint, it will be treated in a fair and objective manner. Both the process and its outcomes are important for establishing trust in the mechanism;
- **Accessible**: Being known to all stakeholder groups for whose use they are intended and providing adequate assistance for those who may face particular barriers in accessing it. The mechanism will be known to all affected stakeholders, regardless of language, gender, age, literacy level or socio-economic standing;
- **Predictable**: Providing a clear and known procedure, with an indicative time frame for each stage, and clarity on the types of processes and outcomes available, as well as means of monitoring implementation;

- **Equitable**: Ensure that aggrieved parties have reasonable access to sources of information, advice and expertise that is necessary to allow engagement with the grievance process. Equitability also implies handling every grievance consistently and with due respect for the complainant;
- **Transparent:** Keeping parties of a grievance informed about its progress, and providing sufficient information about the mechanism's performance to build confidence in its effectiveness and to meet any public interest at stake. It is important for the complainants to understand the timelines for the remaining steps in the procedure, how the complaint will be handled and the types of remedy the project can, or cannot, provide. Transparency will also be needed to respect confidentiality and avoid exacerbating tensions between different groups;
- **Rights-compatible**: Ensuring that outcomes and remedies accord with internationally-recognized human rights. The GRM will not be a substitute for, or undermine, a complainant's right to pursue other avenues of remedy, judicial or non-judicial; and
- **Continuous learning:** Drawing on relevant measures to identify lessons for improving the mechanism and for preventing future grievances and harms. The GRM will contribute to institutional learning by making it possible for the project contractor/ Proponent to identify trends and patterns and to take appropriate measures to reduce the risk of recurrences.

5.1 Terminology and definitions

The GRM uses the following definitions:

- **Complainant**: An individual, community group or organisation that submits a verbal or written complaint against the project or it's contractor.
- **Complaint or grievance**: Any expression of dissatisfaction with the project/contractor activities that the complainant wants to resolve. Grievances usually refer to actual or perceived specific incidents, damage or impact.
- **Dispute**: A point of disagreement between the project and one or more aggrieved parties.
- **Concern or issues:** These can be defined as a question, comment, requests for information, or general perceptions that may, or may not, be related to a specific impact or incident. If not addressed satisfactorily, concerns may become complaints.

5.2 Disclosure and raising awareness of the GRM

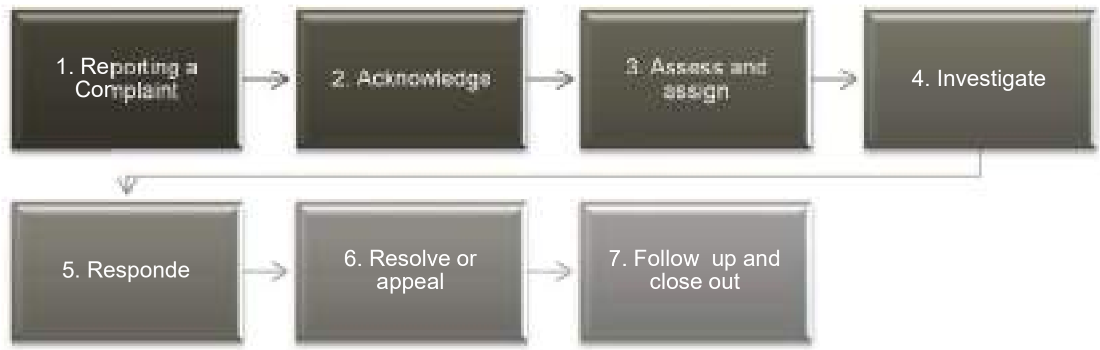
For the GRM to work effectively, the process must be known by potential complainants and considered legitimate by them. Thus, the GRM, and associated avenues for lodging a complaint, will be widely publicised within the project area.

During the construction phase, the contractor will erect a project signboard at their working location and maintain it throughout the construction period. The sign shall contain the relevant emergency telephone numbers and email address where specific site project staff may be reached, and where grievances may be lodged. Because many VGs are unable to read or write, the mechanism will be also communicated verbally at community and public meetings during community engagement associated with the project activities, to ensure that processes, decisions and outcomes are thoroughly understood. During the operational phase, RNT will erect a project noticeboard at conspicuous locations around the servitude (typically at road crossings) or in public places in settlement areas along the route, providing the contact details (telephone and email) to be used to lodge grievances.

Over time, an evaluation of the effectiveness of the grievance procedure will be made. Not having any complaints is usually a bad sign, as it is more likely to mean that the community do not believe that filing a complaint will lead to any action or they that they are unaware that such a procedure exists.

5.3 Grievance management process

The GRM follows the steps provided by the DBSA Project Grievance Procedure (DBSA, 2018), presented below, beginning with the receipt of the complaint, and ending with its resolution or close-out.



1. Reporting a Complaint

Any project-affected party who has a reasonable belief that a DBSA-funded project or programme may potentially result in a health or environmental risk, or cause an adverse impact, may raise a concern or report a complaint verbally in person or through a trusted representative (face-to-face or by phone) or in writing (letter or e-mail), through any of the following channels:

- Community Liaison Officer (CLO) (during project construction and operation);
- Contractor's local office in the project area (during project construction);
- RNT local office branches (during project operation);
- DBSA Grievance Manager: Libby Dreyer, Tel: +27 82 888 6258 / +27 11 313 3507, E-Mail: libbyd@dbsa.org ; or
- https://www.dbsa.org/EN/About-Us/ContactUs/Pages/default.aspx

The concerns or grievances must be genuine and must be without malice and in good faith. When reporting a concern or grievance, it is important that the complainant provide sufficient information that will enable thorough investigation. When a verbal or written complaint is received, the CLO records this in the complaints form with as much detail as possible (date, time, name, contact details, preferred means of contact, nature of grievance or complaint) and forwards it to the complaints co-ordinator. The complaints co-ordinator assigns a unique registration number to the complaint and captures it in the complaints database.

The Project Grievance Form in Table 5.1 may be used to gather complaints.

Table 5.1: Project Grievance Form

Name & Surname	
Organisation	
Address	
Telephone Number	
Email Address	
Project Description	
Project Location ***(Province, City)***	
Nature of the Complaint/ Concern	
Other Comments	

2. Acknowledge

Once a complaint has been registered, complainants should receive a timely acknowledgement that their case is in the system. The complaints co-ordinator prepares a letter that acknowledges receipt, and the CLO delivers the letter to the complainant or their representative (face-to-face) and verbally explains the next steps and their timeframes. When it is not possible to deliver a letter, the acknowledgement should be in made in another culturally-appropriate manner (for example, by phone).

Acknowledgement will occur within 24-48 hours of the complaint being received, and acknowledgement of receipt of the concern and/or grievance will be communicated to the complainant via email and/or in writing.

3. Assess and assign

The complaints co-ordinator undertakes preliminary screening of the complaint to determine whether: (i) it is a complaint (and not a concern or issue); (ii) the complaint is related to project activities or whether it needs to be referred to another party; or (iii) the complaint involves an allegation of a human rights violation or a possible criminal activity. Grievances outside the GRM scope should be referred to an appropriate office/level for addressing through different processes.

The level of severity can help to quickly identify what action is required to address the grievance, in proportion to its potential impact. Grievances may be classified as “low”, “moderate” or “high”.

Conducting a rapid assessment (within 24–48 hours) can help to satisfactorily address smaller issues, so that they do not escalate. It can also remove the need for investigation and, if possible, close out the complaint. Many complaints can be addressed quickly by the complaints co-ordinator. However, if assessment indicates that a complaint is complicated, or the facts are less clear, a field investigation will be initiated to provide evidence for analysis, as well as to support the resolution, and then assign it to the party with the necessary technical expertise to conduct the investigation or that is associated with the complaint.

4. Investigate

Depending on the nature of the complaint, the investigation may need to involve specialists, and steps must be taken to build confidence in the fact-finding process, as follows:

- An investigation will be conducted as speedily as possible and the outcomes/action plan communicated to the complainant within three weeks (15 working days);
- Ideally, investigators should meet face-to-face with a complainant. The investigating team could encourage complainants to have their representative accompany them;
- Consider using interpreters to avoid misunderstanding;
- Document the facts: the investigating team should prepare a succinct report on the findings of the investigation. All information gathered should be maintained and/or logged to ensure that the project company's response is fully documented;
- Ensure co-ordination between the investigating team and the complainant: throughout the investigation process, complainants should be kept informed of progress. If the project company is unable to provide a response within an agreed period, an updated timeframe should be provided.

5. Respond

The grievance investigations will be reviewed at monthly project meetings and will remain active until they have been resolved and an official response has been provided to the aggrieved. The outcome of the investigation will inform whether the:

- Complaint is found to be unrelated to the project. In this case, the complainant is informed (other avenues can be suggested) and the complaint is recorded as closed;
- There is evidence to prove that the complaint is false, in which case the complainant is informed of the investigation's findings and the complaint is recorded as closed;
- Complaint is found to be unsubstantiated, in which case the complainant is informed of the investigation's findings and other possible avenues can be recommended;
- Complaint needs resolution options. It is important to verify whether the proposed resolution addresses the root cause of the grievance so as to minimise the likelihood of recurrences. It is also important to check whether the proposed resolution is in line with the complainant's human rights and that, in solving the complainant's grievance, another person's rights are not infringed upon; and
- Feedback within three weeks (15 working days) is not possible, that the person and the community of the project stakeholder is notified of the reason of the delay.

In some cases, the proposed resolution should be discussed with the complainant rather than unilaterally announcing the verdict. The complainant should have an opportunity to accept or reject the proposition, or to offer an alternative for discussion. Dialogue and negotiation should take place on an equal power base (this means that the complainant should be allowed to bring their representative to accompany them during discussions regarding the response to the investigation). If the response is rejected, another resolution process may be necessary.

The final agreement should be concluded both verbally, as well as in writing. It must be specific, time-bound, agreed upon by both parties and generally remain confidential. However, the complainant themselves may choose to make the outcome public.

The DBSA Stakeholder Engagement and Information Disclosure Standard (ESSS 2) makes provision for circumstances in which a complainant is unable to obtain an adequate response. In this case, the complainant should take their concerns directly to the DBSA, following the procedures outlined on their website[1]. These procedures should be shared with stakeholders so that they can follow the correct approach if the situation arises, and will form part of the Grievance Plan.

6. Resolve or appeal

The GRM should consider a recourse or appeals mechanism for complaints in cases where the complainant and the project company cannot reach agreement. If access to judicial process is complex, very costly or unavailable, the project company and the complainant may mutually agree to enter into negotiation, facilitated by a neutral third party (mediation professional or organisation, an NGO, a lawyer or other respected local, national or international figure). This neutral third party will be agreed to between the project company and the complainant or aggrieved parties. Findings will be non-binding to either party and they will not preclude either party from pursuing legal action.

7. Follow up and close out

Once a resolution has been agreed upon, or a decision made, the response must be implemented and monitored (adjustments may be necessary to ensure that the root causes of complaints are addressed, and that outcomes are consistent with the spirit of the original agreement concluded with the complainant).

Grievance close-out occurs after the implementation of an agreed resolution has been verified. Results must be documented, and the parties' evaluation of the process must be requested (close-out form). Even in cases where an agreement is not reached, it remains important to close the case.

Conducting a follow up and close out can help to maintain the complainant's trust. It is suggested that the implementation of the response and the complaint close-out occur within thirty days of the complaint being received.

---

[1] http://www.dbsa.org/EN/InvestorRelations/Pages/Sustainability.aspx

6 Monitoring and Evaluation

Feedback obtained through the stakeholder engagement process is vital for a balanced and a transparent Sustainability Report (Brydle & Urdangarin, 2017). Monitoring and evaluation of stakeholder engagement should be done in conjunction with monitoring and evaluation as part of the Vulnerable Groups Plan (VGP), as well as the Resettlement Policy Framework (RPF) presented as Annexures B and C of the ESMP (Vol. III), respectively.

The effectiveness of this SEP should be evaluated against its objectives. This should be done from two perspectives, namely whether project engagement efforts are being undertaken in the correct manner and whether from the stakeholders' perspectives, i.e. how stakeholders feel about the project company.

The following indicators could be used in the evaluation:

- Progress made by the project in respect of keeping stakeholders informed, and other forms of engagement, as recorded in the Stakeholder Engagement Tracking Register (see Table 6.1);
- The outcome of each engagement (negative or positive) and any steps taken to turn negative outcomes into positive ones, as recorded in the Tracking Register; and
- The number and nature of grievances registered with the project company over time, and any corrective steps taken.

6.1 Monitoring objectives

Stakeholder Engagement Monitoring has an objective to verify that:

- Actions and commitments described in the SEP are implemented fully and on time;
- SE programs remain aligned with DBSA and IFC requirements and, where non-compliances are identified, timely and effective corrective actions are undertaken;
- Actions are effective in achieving outcomes consistent with those defined in the VGP (i.e. broadening socio-economic benefits generated by the project, compensating affected stakeholders for potential losses of natural resources, and ensuring stakeholder engagement);
- Complaints lodged by stakeholders are followed up on and, where necessary, appropriate corrective actions are implemented; and
- Regular progress reporting occurs to keep project management, PAPs and other interested stakeholders appropriately informed about SEP progress and issues.

Table 6.1: Stakeholder Engagement Tracking Register

Date/place	Event	Company staff in attendance	Organisation/s engaged with	Meeting summary/ key issues raised	Was engagement positive?	Measures taken to make it positive	Was response/measure positive?
Date and town or village name	Quarterly meeting and Name of Committee	Mr xxxx, position	Name of Committee	Schedule and prices for products	No	One-on-one discussions with Committee members and dissatisfied individuals; Ask for suggestions on how to resolve; Another Committee meeting	Yes (If not, engage again using an independent facilitator until agreement is reached)
Date and project site		All senior and mid-level staff, most employees	List all organisations that attended	List all comments and questions received; Categorise them	90%	One-on-one discussions with individuals that had negative comments; Ask for suggestions on how to resolve	Yes (If no, engage again using an independent facilitator until agreement is reached)

6.2 Performance indicators

SE monitoring presupposes the development of a set of indicators (quantitative or qualitative), which allow for the evaluation of implemented actions. The indicators are divided into input, output and outcome indicators (Table 6.2):

- **Input (or progress) indicators**: Measure whether inputs are being delivered in accordance with the schedule and as defined in the SEP. Inputs are services, resources or goods that contribute to achieving outputs and, ultimately, desired outcomes;
- **Output (or performance) indicators**: Measures the direct results of inputs; and
- **Outcome (or impact) indicators**: Evaluates the effectiveness of SEP inputs and outputs in achieving the objectives of the SEP. Outcomes are usually not immediately evident.

Table 6.2: SEP monitoring

Action	Indicator	Verification means	Monitoring frequency
SEP implementation	N.º human resources of SEP team	Contracts	Quarterly
	N.º SEP actions implemented	Progress report	Quarterly
	Budget spent on SEP implementation	Progress report	Quarterly
	N.º SE activities related to SEP	Registration Sheets	Monthly
	N.º Complaints received related to SEP	Complaints form	Monthly
VG engagement	Refer to VGP		
Grievance Redress Mechanism	% PAPs' understanding of avenues and steps for expressing a grievance	Engagement registration sheets	Quarterly
	N.º complaints (related to SEP) satisfactorily resolved	Complaint form; complaint close-out form	Quarterly

7 Conclusion

Stakeholder engagement is an ongoing and iterative process and should continue throughout the project lifecycle. It aims to ensure that a business venture remains in touch with the community it serves, as well as with their needs and issues. It also ensures that potential impacts continue to be identified and managed in a responsible fashion, thus lowering overall business risk and improving resilience.

To ensure this continues throughout the lifecycle of the development, it is important that the process be recorded appropriately, and be monitored. All meetings should have signed registers and all issues raised should be recorded in either the Comments and Response Report (CRR) or the GM. Feedback should also be given to those who continue to have an interest in the project.

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APPENDIX A:

Notes from the pre-application meeting

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Meeting Record

Project number	113550	Meeting date	2018-09-03
Project name	ANNA Transmission Project	Recorded by	YSC
Meeting/subject	Presentation to the Authorities	Total pages	1

Present	Apology	Copy	Name	Organisation	Contact details
☑	☐	☐	Ana Yolanda	MINAMB	
☑	☐	☐	António Barreto dos Santos	Aurecon Angola	
☑	☐	☐	Joaquim Boaventura	RNT	
☑	☐	☐	Tárcio Cardoso	RNT	
☑	☐	☐	Yassimina Silva da Costa		
☐	☐	☐			
☐	☐	☐			

Item	Topic	Action by	Action due	Action complete
1	Presentation of the project	YSC	2018-09-03	2018-09-03
2	Approach from the MINAMB about Project registration, the environmental and social descriptor and licensing process of the subconsultants	AY	Select date	Select date
3	RNT agreed to submit the Project registration Process in 2 weeks' time	TC & JB	Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date

Next meeting: Select date

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Meeting Record

Project number	113550	Meeting date	2018-12-17
Project name	ANNA Transmission Project	Recorded by	YSC
Meeting/subject	Demining Process	Total pages	1

Present	Apology	Copy	Name	Organisation	Contact details
☑	☐	☐	General Afonso Calei	CED/MINDEF	
☑	☐	☐	Coronel Anacleto	CED/MINDEF	
☑	☐	☐	António Inglês Pinto	RNT	
☑	☐	☐	Coronel João Sebastião	CED/MINDEF	
☑	☐	☐	Feliciano Samba	RNT	
☑	☐	☐	Hugo Costa	Aurecon Angola	
☑	☐	☐	Tárcio Cardoso	RNT	
☑	☐	☐	Yassimina Silva da Costa	Aurecon Angola	
☐	☐	☐			
☐	☐	☐			

Item	Topic	Action by	Action due	Action complete
1	Presentation of the project	AIP	2018-12-17	2018-12-17
2	Approach of the Consultant about the areas and collaboration needed	HG	Select date	Select date
3	Was clarified that will be no demining for this phase of the project. A team of 12 of the CED will be participating the field work to guide through safe areas	GAC	Select date	Select date
4	Aurecon will define the Action Plan with timings.	AIP /HC	2019-01-11	2019-02-07
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date
			Select date	Select date

Next meeting: Select date

Project 113550 File Document1 2018-07-23 Revision 0 Page 1

RNT

AO
MINISTÉRIO DO AMBIENTE
Direcção Nacional de Prevenção e Avaliação de Impactos Ambientais
Engª Nelma Caetano
MINAMB

LUANDA

N/REF 3883/ 571 /GPCA-RNT/2018

ASSUNTO: REGISTO DO ESTUDO DE IMPACTO AMBIENTAL DO PROJECTO DE CONSTRUÇÃO DA LINHA DE INTERLIGAÇÃO ANGOLA-NAMÍBIA

Excelentíssima Senhora Directora,

Queiram, antes de mais, aceitar as nossas cordiais saudações.

A Empresa Rede Nacional de Transporte de Electricidade, Empresa Pública tutelada pelo Ministério da Energia e Águas, está a desenvolver um projecto de construção da linha de transporte de energia Eléctrica à 400 kV para interligação dos sistemas electricos de Angola e Namíbia. Em cumprimento do estipulado no Decreto Executivo nº 92/12 de 1 de Março, vem por meio desta, solicitar o Registo do Projecto em epígrafe para a elaboração do respectivo Estudo de Impacto Ambiental, remetendo para os devidos efeitos os Modelos de Requerimento devidamente preenchidos (Anexo I – Ficha de Inscrição e Anexo I – Descrição Simplificada do Projecto), bem como o documento descrito no campo nº 4 deste mesmo decreto.

Sem outro assunto de momento, queira aceitar, Excelentíssima Senhora, a expressão da nossa alta consideração.

Atentamente

GABINETE DO PRESIDENTE DO CONSELHO DE ADMINISTRAÇÃO DA RNT-EP, em Luanda, aos 26 de Novembro de 2018.

O PRESIDENTE DO CONSELHO DE ADMINISTRAÇÃO

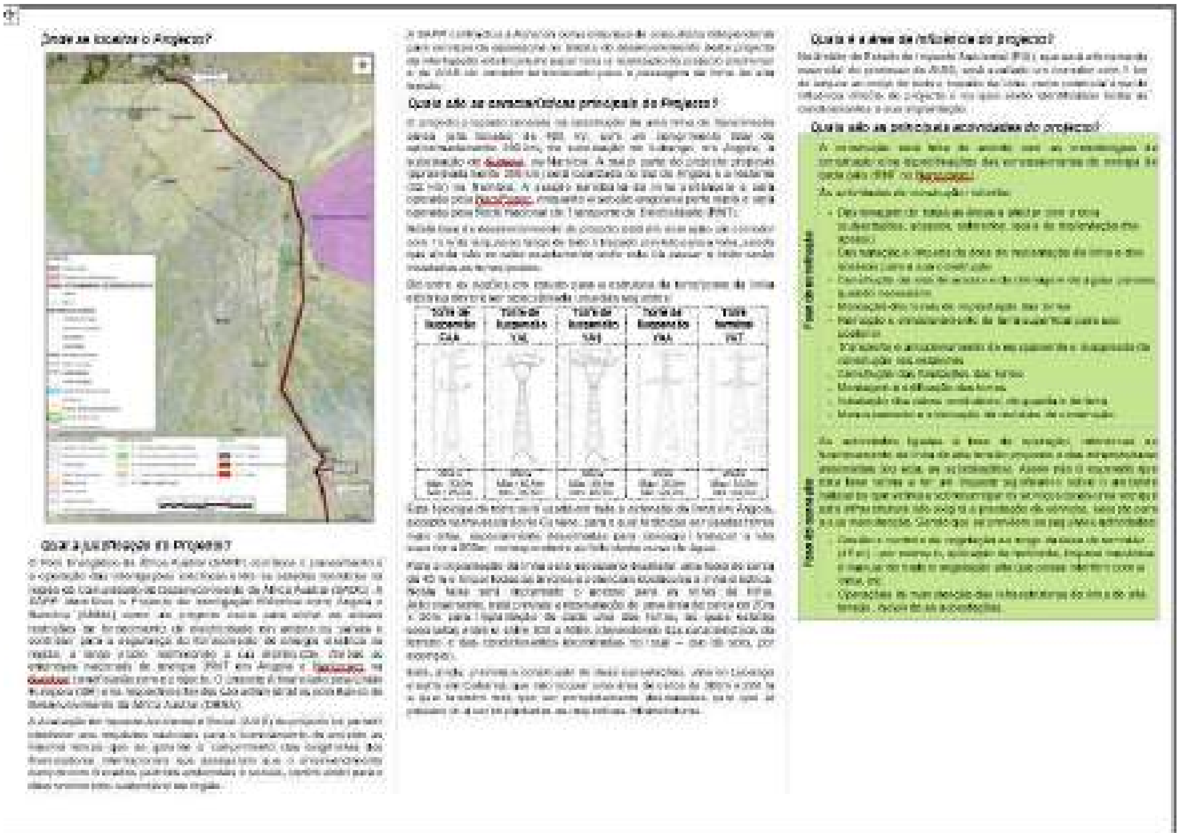
RECEBI: Wilson
Aos 28-11-2018

RUI PEREIRA DO AMARAL GOURGEL

Rede Nacional de Transporte de Electricidade - RNT, E.P.

APPENDIX B:

Non-technical pamphlet and participation form for the Scoping Phase



Onde se localiza o Projecto?

Qual a justificação do Projecto?

Quais são as características principais do Projecto?

Qual é a área de influência do projecto?

Quais são as principais actividades do projecto?


O que é o processo de Avaliação de Impacte Ambiental e Social (AIAS)?

Quem vai preparar o Estudo de Impacte Ambiental e Social (EIAS)?

Como posso participar e dar a minha opinião?

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RNT

Consulta Pública

Proposta de definição do âmbito

ESTUDO DE IMPACTE AMBIENTAL E SOCIAL (EIA) DO PROJECTO DE INTERLIGAÇÃO ELÉCTRICA ENTRE ANGOLA E NAMÍBIA (ANNA)

Proponente

RNT

Consultor

aurecon

Junho, 2018

ESTUDO DE IMPACTE AMBIENTAL E SOCIAL (EIA)
DO PROJECTO DE TRANSMISSÃO ELÉCTRICA
ENTRE ANGOLA E NAMÍBIA (ANNA)

Referencia Aurecon: 113660

Formulário de registo e comentários

Por favor registe-me como Parte Afectada e Interessada (PIA) para que possa receber informações contínuas acerca deste EIA

Nome			
Organização		**Titulo**	
Morada			
N° telemóvel		**Email**	
N° telefone		**Fax**	

Por favor indique como prefere ser contactado/a:
□ Correio □ Fax □ Email □ Outro, qual?……………………………………………

COMENTÁRIOS: (Por favor acrescente mais folhas de papel a esta se precisar)

1. As seguintes questões devem ser consideradas no âmbito do projecto e do processo de Avaliação de Impacte Ambiental:

…………………………………………………………………………………………………
…………………………………………………………………………………………………
…………………………………………………………………………………………………
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…………………………………………………………………………………………………
…………………………………………………………………………………………………

2. Por favor, adicione as seguintes partes interessadas e afectadas à lista:

…………………………………………………………………………………………………
…………………………………………………………………………………………………

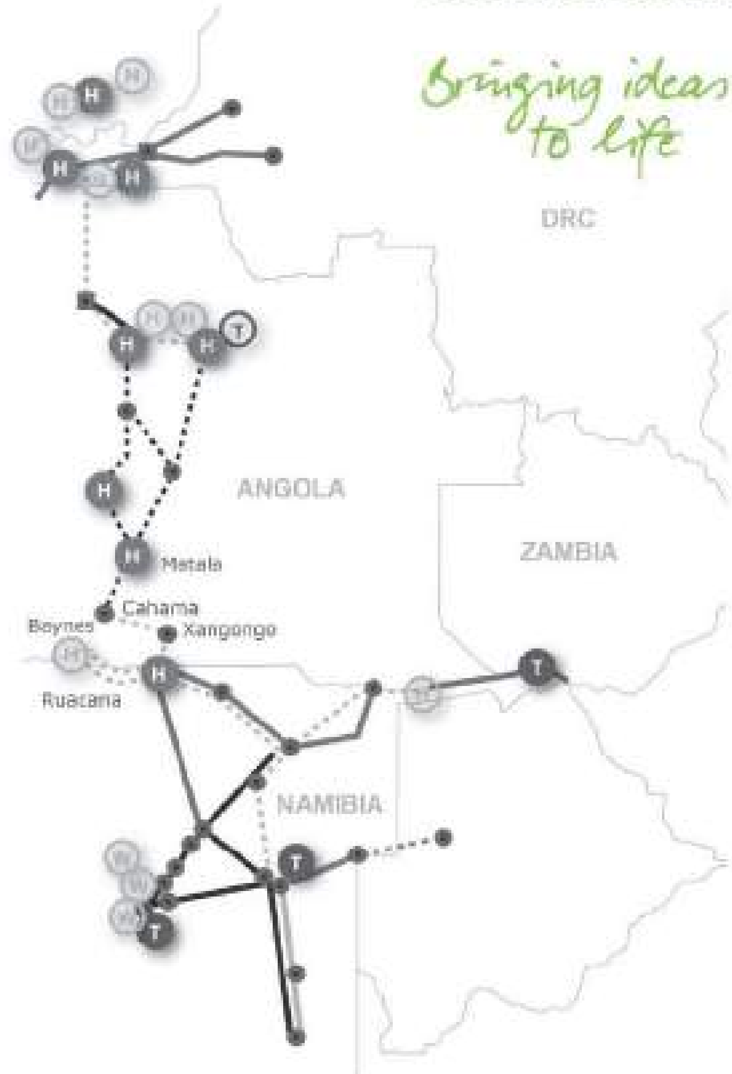
Obrigada pela sua participação!

Entregar o Formulário de registo e comentário na Sede Provincial, Municipal ou Comunal.
Ou fazer chegar às seguintes entidades: RNT ou Aurecon conforme constante no panfleto relativo à descrição do projecto

Annexure B: Vulnerable Group Plan (VGP)

aurecon

Bringing ideas to life



ANNA

TRANSMISSION PROJECT

ANNA TRANSACTION ADVISORY SERVICES

Environmental and Social Impact Assessment
Angola
Volume III - Environmental and Social Management Plan
Annexure B: Vulnerable Group Plan (VGP)

March 2020

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CONTENTS

List of Figures

List of Tables

ABBREVIATIONS

Abbreviation	Definition
AAAC	All-Aluminium Alloy Conductor
AC	Alternating Current
ACSR	Aluminium Conductor Steel Reinforced
AIDS	Acquired Immune Deficiency Syndrome
AML	Lubango Municipal Administration (Administração Municipal do Lubango)
ANNA	Angola-Namibia Interconnector Project
ANR	National Waste Agency - Agência Nacional de Resíduos
BAU	Business as Usual
BCE	Before the Common Era
BESS	Battery Energy Storage System
°C	Celsius
CBD	Convention on Biological Diversity
CCS	Carbon Capture and Storage
CE	Common Era
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COP	Conferences of the Parties
DAI	Direct Area of Influence
DBSA	Development Bank of Southern Africa
DoD	Depth of Discharge
DNPAIA	Direcção Nacional de Prevenção e Avaliação de Impactes Ambientais - National Direction for Prevention and Assessment of Environmental Impacts
DRC	Democratic Republic of Congo
EBRD	European Bank for Reconstruction and Development
ECB	Electricity Control Board
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
EL	Environmental Licence
EMF	Electromagnetic Field
ENDE	National Electricity Distribution Company
ENSO	El Niño–Southern Oscillation
EO	Environmental Officer
EPC	Engineering, Procurement, Construction
EPFI	Equator Principles Financial Institution
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESSS	Environmental and Social Safeguard Standard
EU	European Union
Ex	Extinct Species
FACTS	Flexible AC transmission systems
FI	Financial Intermediary
FNLA	National Front for the Liberation of Angola
FPIC	Free, Prior and Informed Consultation
GCM	Global Climate Models
GEF	Global Environment Fund
GHG	Greenhouse Gas
GIS	Geographic Information System
GM	Grievance Mechanism
GRAE	Angola’s Revolutionary Government in Exile
GWP	Global Warming Potential
ha	Hectare
HDPE	High-density polyethylene
HIV	Human Immunodeficiency Virus
HVAC	Heating, Ventilation and Air Conditioning
HVDC	High Voltage Direct Current

Abbreviation	Definition
IAI	Indirect Area of Influence
I&AP	Interested and Affected Party
IBA	Important Bird Area
ICP	Informed Consultation and Participation
IFC	International Finance Corporation
INDC	Intended Nationally Determined Contribution
INRH	National Institute of Water Resources of Angola
IP	Indigenous People
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IRP	Integrated Resource Plan
ISO	International Standards Organization
IUCN	International Union for Conservation of Nature
km	Kilometre
kT	Kilo Tonnes
kV	Kilovolt
LIDAR	Light Detection and Ranging
LLSU	Large Livestock Stock Units
L&FS	Life and Fire Safety
LSA	Later Stone Age
LVIA	Landscape and Visual Assessment
masl	Metres above sea level
MANco	Management Committee
MAV	Maximum Allowed Values
m	Metre
m^2	Square Metre
MCDM	Multi-Criteria Decision Making
MFA	Armed Forces Movement
MINAMB	Angolan Ministry of Environment
MPI	Multidimensional Poverty Index
MPLA	People's Movement for the Liberation of Angola
MSA	Middle Stone Age
MVA	Mega Volt Amp
MW	Megawatt
MWh	Megawatt Hour
MWp	Megawatt Peak
NamPower	Namibia Power Corporation (Proprietary) Limited
MRV	Maximum Recommended Values
NAPA	National Adaptation Programme of Action
NOx	Nitrous Oxide
NTS	Non-Technical Summary
OCGTs	Open Cycle Gas Turbines
OECD	Organisation for Economic Co-operation and Development
OHS	Operational Health and Safety
OPEC	Organization of the Petroleum Exporting Countries
OPGW	Optical Ground Wire
OPHI	Oxford Poverty and Human Development Initiative
PAC	Project Affected Community
PAP	Project Affected Person
PM	Particulate Matter
PNAAC	National Climate Change Adaptation Plan
PNE	National Emissions Plan
PPE	Personal Protective Equipment
PRODEL	"Empresa Pública de Produção de Electricidade"
PS	Performance Standard
PV	Photovoltaic
RAI	Regional Area of Influence
RAP	Resettlement Action Plan
RCP	Representative Concentration Pathways
REPTUR	General Regulation on the Territorial, Urbanistic and Rural Plans
RNT	Rede Nacional de Transporte de Electricidade
RPF	Resettlement Policy Framework

Abbreviation	Definition
RTE	Round Trip Efficiencies
RTT	Resettlement Task Team
SADC	South African Development Community
SAPP CC	Southern African Power Pool Co-ordination Centre
SCC	Social Cost of Carbon
SDG	Sustainable Development Goal
SEP	Stakeholder Engagement Plan
SFDRR	Sendai Framework for Disaster Risk Reduction
SFP	Strategy to Fight Poverty
SMHI	Swedish Meteorological Hydrological Institute
SPI	Standardised Precipitation Index
STD	Sexually-Transmitted Disease
SR	Scoping Report
SWAPO	South-West Africa People's Organization
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TB	Tuberculosis
ToR	Terms of Reference
TSS	Total Suspended Solids
TURH	Titles of Use of Water Resources
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNITA	National Union for the Total Independence of Angola
USD	United States Dollar
UXO	Unexploded Ordinance
VAC	Visual Absorption Capacity
VG	Vulnerable Group
VGP	Vulnerable Groups Plan
Vul	Vulnerable Species
W	Watts
WB	World Bank
WCDRR	World Conference on Disaster Risk Reduction
WHO	World Health Organisation
WWTP	Waste Water Treatment Plant

1 Introduction

The Angola–Namibia (ANNA) Transmission Interconnector Project (the "project") is one of the energy pool initiatives promoted by the Southern African Power Pool (SAPP), to alleviate the current electricity supply constraints and contribute towards security of energy supply in the long run, by enhancing the distribution of electricity in the Southern African Development Community (SADC) region.

The Environmental and Social Impact Assessment (ESIA)[1] documentation for the Angolan portion of the ANNA Project is divided into three volumes: Volume I consists of the Non-Technical Summary (NTS), Volume II comprises the ESIA Report, and Volume III constitutes the Environmental and Social Management Plan (ESMP). Separate ESIA documentation has been compiled for the Namibian part of the line.

This Vulnerable Groups Plan (VGP) forms part of the ESMP, as Annexure B, and aims to ensure inclusion of all Vulnerable Groups (VG) into the project implementation to enhance its social performance.

The aim of the project is to alleviate the current electricity supply constraints and to contribute towards the security of energy supply by enhancing the distribution of electricity in the region. From its conception, the ANNA project has had the objective of promoting the highest positive economic, social and environmental impact possible whilst ensuring that all negative social and environmental impacts are addressed by avoiding negative impacts, or where they can't be avoided, minimising and compensating over and above the estimated impacts. This philosophy aims to ensure that the project attains a net positive social and environmental impact and contributes to the overall sustainable development of Angola and Namibia. These considerations were included in the initial conception of the project by means of selecting a route for the transmission line corridor that would avoid all identified sensitive environmental and social resources, as much as possible, as explained in Section 2.10 of the ESIA Report (Volume II).

The project is intended to link the Namibian and Angolan electricity networks in the north-western part of Namibia and in the southern part of Angola, initially supplying power to towns in the southern part of Angola, mainly Xangongo, Cahama and Ondjiva, as well as to provide for the future integration of 400 Kilovolt (kV) line(s) from the proposed Baynes Power Station[2]. Anticipated economic benefits include unlocking cheaper energy generation sources across the region, improved access to renewable energy sources (with lower emissions), reduced cost of transmission (due to an increase in transmission route options) and a reduced risk of supply interruptions to both countries. These objectives combined contribute towards the United Nations Development Programme (UNDP) Sustainable Development Goals (SDGs), as discussed in Section 3.3.4 of the ESIA Report (Volume II) and demonstrates progress towards the additional objective of climate co-benefits. The project design also included the applicable mitigation and adaptation measures, in order to minimise its vulnerability to climate change and increase its resilience.

This project is a proposed 400 kV overhead transmission line (approximately 362 km in length), to link the Namibian and Angolan electricity networks in the north-western part of Namibia (from the proposed Kunene substation), with the southern part of Angola (to the proposed Lubango substation), initially supplying power to towns in the southern part of Angola, mainly Xangongo, Cahama and Ondjiva, but also to make provision for the future integration of the 400 kV line(s) from the proposed Baynes Hydro-power facility. The Proponents of the project are the Angolan *Rede Nacional de Transporte de Electricidade* (RNT), and NamPower in Namibia.

Most of the proposed project (approximately 331 km), will be located in southern Angola, and the remaining (31 km) in Namibia.

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[1] Although referred to as an ESIA process internationally, the terminology used in the Angolan legislation is Environmental Impact Assessment (EIA) process and, in order to maintain consistency throughout this report, the term ESIA process will be used.
[2] Planned on the Kunene River downstream of Ruacana.

The project is currently in the concept design phase, and the detailed design is not yet available. The final alignment of the transmission line will only be determined once the project has received its Environmental Licence, taking into consideration identified environmental and socially sensitive areas.

In accordance with the Development Bank of Southern Africa (DBSA), and the International Finance Corporation's (IFC) standards for socially sustainable development, a Vulnerable Groups Plan (VGP) must be developed when the Environmental and Social Impact Assessment (ESIA) identifies that vulnerable groups (VGs) are present within the project site and when they may be negatively affected by the project.

For these standards, the term "vulnerable groups" is used in a generic sense to refer to people that experience a higher risk of poverty, and social and economic exclusion, than the general population, and who possess the following characteristics:

- Persons who are limited in their ability to defend their rights to, and interests in, land and natural and cultural resources, and which may restrict their ability to participate in, and benefit from, development;
- Self-identify as members of a distinct indigenous social cultural group, and recognition of this identity by others;
- A distinct social and cultural group that is collectively attached to geographically-distinct ancestral territories and natural resources in a project area;
- Customary cultural, economic, social, or political institutions distinct, or separate, from those of the mainstream society and culture;
- A distinct language or dialect, often different from the official language or languages of the country or region in which they reside; and
- Migrants, elderly, disabled people/people with special needs, and women.

The Socio-economic Impact Assessment (SIA) conducted under the project's ESIA confirms that the project has the potential to affect VGs, namely Indigenous People (*Mudimba* and *San* communities) and women. Such groups are susceptible to exclusion from, and/or unable to fully participate in, the mainstream consultation process and, as such, require specific measures and assistance to ensure adequate inclusion in project activities. Thus, the applicability of DBSA ESSS (2018) and IFC Standards (2012) is triggered by the project, hence the creation of this document, the VGP for the project.

The VGP was designed to ensure inclusion of VGs into the project implementation to enhance the social performance of the ANNA project, with full respect to dignity, human rights, economies and cultures of VGs, in particular:

- To avoid, minimize or compensate for potential impacts on VGs, broadening socio-economic benefits generated by the project;
- To ensure the Free, Prior, and Informed Consent (FPIC) of affected VGs; and
- To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with VGs affected by the project.

The VGP forms part of the project's Environmental and Social Management Plan (ESMP) and must be seen as a dynamic document to be updated continuously throughout the project lifecycle in order to adapt to conditions on the site or meet the needs of the VGs.

The VGP content follows and complements the DBSA and IFC requirements, and includes the following:

- **Project description:** This section provides a brief description of the project and objectives and discusses project components and activities that may cause impacts on VGs.
- **Methodology:** This section provides a description of the methodology that led to the preparation of the VGP.

- **International standards applicable:** This section provides a description of international standards applicable to VGs.
- **Socio-economic assessment**: This section provides a summary of the SIA conducted as part of the project's ESIA, including a summary baseline of the characteristics of the VGs present in the project area, as well as an assessment of the nature and degree of socio-economic impacts on these VGs, and the identification of measures proposed to avoid, minimise or compensate for the identified impacts.
- **Mitigation and enhancement plan**: This section provides the implementation of proposed measures, description of the role-players' responsibilities, an action plan and cost estimates for the VGP's implementation.
- **Vulnerable group engagement:** This section provides the participatory planning process and the Grievance Mechanism that aim to ensure effective VG engagement.
- **Monitoring and evaluation plan**: This section establishes a monitoring system to ensure effective implementation of the VGP at a community level.

2 Methodology

The VGP is based on the results of the SIA that was conducted as part of the project's ESIA, and is aligned with DBSA ESSS and IFC Standards, in particular *Community Health, Safety and Security*, *Indigenous Peoples*, *Stakeholder Engagement and Information Disclosure* and *Gender Mainstreaming Standards* (a brief description of these standards is included in Section 3). It was design through a consultative process conducted during the SIA fieldwork between 7 and 27 April 2019.

Introductory field meetings were held with legitimate representatives, referred to as *Sobas*, of the local communities that are present in the project area. These meetings served to gain a better understanding of the local social reality and, above all, establish the first contact with, and between, the potentially-affected VGs and the project team.

Figure 2.1: Meeting with Traditional Leader (*Soba)*

In this meeting, the project description and objectives were introduced, and participants were requested to express their opinions, concerns and expectations about the project. They were also interviewed about what they foresee as being the best approach for future engagements, and how best to connect with the local communities, thereby conveying project information in a way that is understandable to the majority of the population, especially those members of the VGs. The main results (concerns and expectations) gathered during the meeting are described in section 5.1.

A noteworthy fact is that the Namibian component of the ANNA Project has already undertaken a set of stakeholder engagements as part of its legal ESIA process, and some pertinent issues were raised, which have also been considered in the project implementation for Angola. These reported issues, as discussed in Section 7.1.4, refer to gender and social matters relating to vulnerabilities and should be taken into consideration for future stakeholder engagement activities during the next project stages

3 Applicable International Standards

A brief description of IFC and DBSA standards applicable to this VGP, is included in the following tables.

Table 3-1: Applicability of IFC Performance Standards (PS), 2012

Performance Standard	Description of the Performance Standard
PS 4: *Community Health, Safety and Security*	• Addresses proponent's responsibility to avoid, or minimise, the risks and impacts to community health, safety, and security, especially for vulnerable groups. • This includes communities already subjected to impacts from climate change, who may also experience an acceleration and/or intensification of impacts due to project activities.
PS 7: *Indigenous Peoples*	• Recognises the rights of Indigenous People, as marginalised and vulnerable groups, and defends their rights to, and interests in, land and natural and cultural resources.

Table 3-2: Applicability of DBSA Environmental and Social Safeguard Standards (ESSS), 2018

ESSS	Description of the Safeguard Standard
ESSS2: *Stakeholder Engagement and Information Disclosure*	• Establish a systematic and inclusive approach to stakeholder engagement to build and maintain a constructive relationship with project beneficiaries, and project-affected parties, throughout the project lifecycle. • Create an enabling environment that allows project beneficiaries and project-affected parties to exercise their rights regarding the project, and to influence project design and environmental and social performance. • Provide key stakeholders with appropriate project information on environmental and social risks and impacts in an understandable, transparent, and appropriate manner, which enables stakeholders to make informed choices. • Provide project beneficiaries and project-affected parties with accessible and inclusive means to raise their grievances, and allow the proponent to effectively respond to concerns raised in a comprehensive manner.
ESSS3: *Gender Mainstreaming*	• Protect women's human rights and comply with international women's and human rights standards and treaties. • Increase knowledge and insights about gender and vulnerable groups (including people living with disabilities) and incorporate this into project concepts and governance. • Identify strategies to increase women's and marginalized groups' participation and representation in sustainable infrastructure project solutions. • Adopt due diligence practices that mainstream gender considerations into project planning and execution, thereby ensuring that projects respond to distinct gender needs and proactively address gender inequalities, including men's and women's differential access to assets, property, education, credit, and other resources. • Identify and prevent potentially direct or indirect project or programme-related harm to women, men, girls and boys, including changes in livelihood or environmental degradation and sustainability. • Incorporate sex-disaggregated data into project reporting, to accurately measure and assess various investments' impacts on the different genders. • Proactively engage women and men in culturally-appropriate languages, forms and ways throughout the project lifecycle, on the basis of FPIC principles.

ESSS	Description of the Safeguard Standard
	• Provide adequate budget for integrating gender empowerment into project execution plans.
ESSS4: *Indigenous Peoples*	• Ensure that the development process respects Indigenous People's human rights, dignity, aspirations, culture, and natural resource-based livelihoods. • Anticipate and avoid adverse project impacts on communities of Indigenous People, or, when avoidance is not possible, to minimise and/or compensate for such impacts. • Promote sustainable development benefits and opportunities for Indigenous People in a culturally-appropriate manner. • Undertake full FPIC with Indigenous People, where projects impact on their livelihood, land, and natural resources, in a manner cognisant of their language, customs and traditions, for any investment or development throughout the project's lifecycle.
ESSS7: *Community Health and Safety*	• Anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project lifecycle. • Promote quality and safety in the design of infrastructure and construction. • Avoid or minimise community exposure to project-related traffic and road safety risks, diseases and hazardous materials. • Put effective measures in place to address emergency events and avoid disasters. • Ensure that personnel and property are safe.

4 Project description

The following sections summarise the main characteristics of the project. For further details on the ANNA Project, refer to Section 2 of the ESIA Report (Volume II).

4.1 Project location

The transmission line in Angola starts at the proposed Lubango substation, north-east of the town of Lubango, from where it runs east for ±6.5 km, and whereafter it turns south-east, running in this direction for for ±64 km. The route then turns south south-west, bypassing the Bicuar National Park and continuing for ±93 km, and then meets the Lubango-Cahama road at a point near Capanda, after which it follows this road for approximately 35.5 km until it reaches Cahama. Near Cahama it turns west and runs in this direction until it reaches the proposed Cahama substation. After exiting the Cahama substation, it continues south-east for ±91 km, after which it extends for a further ±39 km in a south-westerly direction before reaching the Namibian border.

Administratively, the study area falls within the following municipalities:

Table 4-1: Administrative location of the project

Province	Municipalities
Huila	Lubango
	Chibia
	Gambos (ex. Chiange)
Cunene	Cahama
	Curoca (ex. Oncocua)
	Ombadja

4.2 Project components

Technically, the proposed project will comprise of structural components that are standard equipment for 400 kV transmission lines, as described below.

1. **Electrical infrastructure**: On a functional level, the project as a whole includes: (i) one fully-equipped 400 kV line bay (for Cahama) at the proposed Lubango substation; (ii) at Cahama, a 400/220 kV substation equipped with two 400/220 kV transformers and three 400 kV line bays (for Lubango, Kunene and the proposed Baynes Hydro-power facility); and (iii), approximately 361 km, 400 kV single-circuit transmission line.
2. **Pylons to support the overhead transmission line**: Various types of pylon structures can be used, depending on the landscape, engineering design, and the biophysical environment. They will vary between 54.5 m and 24 m in height. The distance between each pylon will be between 300 m and 500 m, depending on the terrain. A Triple Sorbus AAAC conductor is proposed. The final pylon positions will take into consideration any sensitive areas and/or No-Go areas that have been identified by the specialists during the walk-through before construction. The final sizes and positions will therefore only be determined once the project has received its Environmental Licence, once demining and land acquisition has been finalised, and after detailed geotechnical assessments have been undertaken.
3. **Foundations to support pylons**: The footprint of each pylon foundation will be up to 12 m x 10 m in extent, and foundations may be up to a depth of 5 m. Foundations will occupy only small portions of the footprint, and the remainder of the footprint will remain open. The foundation types and depths will vary, based on the pylons, type of soil, and type of terrain (rockiness).

4. **Servitude areas**: A 45 m servitude will be defined for the powerline. This servitude will impose restrictions on the use of the property within this corridor. A 12 m wide strip will be cleared of trees and obstacles within the servitude, as well as a footprint of approximately 20 m x 20 m around each pylon.

5. **Access**: Access tracks will be required for construction, and will remain in place for the operational lifespan of the infrastructure. No paved access roads will be constructed, unless there are steep sections of the route where erosion is a risk. Generally, the access track would be a single track. Access roads will run the length of the proposed servitude and will mostly be directly below the transmission line.

4.3 Project activities

Prior to the construction phase (**pre-construction activities**), the following activities will take place once the necessary Environmental Licence has been issued:

1. Walk-over survey to identify the corridor;
2. Detailed survey to fix alignment;
3. Wayleave application, where required;
4. Land acquisition process;
5. Survey check to identify exact pylon locations;
6. Soil investigation of selected pylon locations to inform foundation design; and
7. Final designs.

The **construction phase** is expected to take 24 - 36 months, but this will vary depending on the weather conditions at the time of construction (work will not necessarily be undertaken in a linear sequence, as most of the activities can occur concurrently and in parallel, depending on the phasing of construction). In summary, this phase will entail the following (not necessarily in the order described):

1. Mobilisation of workers, machinery and construction equipment: A mixture of unskilled temporary employees, semi-skilled and highly-skilled employees will be required for construction. 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 camp, depending on the distance to the construction site;

2. Survey and development of access roads;

3. Clearing of vegetation and stripping of the topsoil in the construction camp/s, construction site/s, right-of-way, and at each pylon location;

4. Set up of temporary camps, with an approximate size of 5 000 m^2 (0.5 ha). It is expected that approximately 15-20 camps will be required. The camps will be preferentially located in already-disturbed (cleared) locations. Selection of the laydown areas will be made in consultation with the Environmental Control Officer (ECO). The temporary construction camp and laydown areas will be rehabilitated once construction is completed. The camp is expected to include the following components:

    - A site office, consisting of prefabricated units;
    - Accommodation (if located far from settlements), consisting of prefabricated units;
    - Eating and ablution facilities;
    - Laydown areas for infrastructure;

- Concrete mixing plant;
- Storage facilities for materials, equipment or waste;
- Equipment parking area;
- Power supply (generator);
- Fuel storage containers for generators and vehicles;
- Water supply (borehole or water treatment plant, or a water tank);
- Security fencing; and
- Mobile toilets and/or French drains for treated sewage disposal.

5. Transport of all the required materials, equipment and components to the camp/s and to each pylon location;
6. Movement and operation of heavy machinery and equipment;
7. Waste production and management;
8. Surveying and pegging of pylon locations;
9. Earthworks associated with the pylon;
10. Construction of concrete foundations to support the pylons (including installation of earth connection and installation of support bases);
11. Assembly and erection of pylons using temporary laydown areas at each pylon;
12. Laying of cables, conductor stringing, line signalling, aerial beacons and bird diverters, which entails unrolling, adjusting and securing of the cables, using the areas around or between the pylons. If crossing over or beneath obstacles (namely roads, rails and other aerial lines), the erection of temporary protective structures;
13. Conductor and optical groundwire stringing;
14. Installing of anti-climbing devices on the towers; and
15. Demobilisation of construction work sites and rehabilitation of the affected areas.

The **operational phase** refers to the operation of the proposed transmission line (electricity transmission) and associated infrastructures. The infrastructure would not require service provision, except for maintenance. The following activities is envisaged during the anticipated operational lifespan of 30 years:

1. General functioning of the transmission line (physical presence and functional characteristics);
2. 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;
3. Vegetation management along the servitude, e.g. cutting and pruning of trees, selective herbicide application, mechanical and manual bush clearing; and
4. Management of waste produced, associated with the periodic maintenance actions (limited to pylon footprints).

It must be noted that all maintenance will be done according to specifications of the utility company (in this case RNT).

The proposed powerline is permanent infrastructure, and there is **no intention to decommission it**. However, should the powerline need to be decommissioned at some stage, it will *inter alia* consist of the following activities:

1. Dismantling and removal of transmission cables and pylons;
2. Rehabilitation of pylon foundations and other disturbed areas;
3. Transport and disposal of the material offsite; and
4. Monitoring (site surveys), which may be required after rehabilitation has been completed. The aim of monitoring, and maintenance, is to ensure that the rehabilitation objectives were met, and that the rehabilitation process was successful.

5 Socio-economic Assessment

This section provides a summary of the SIA that was conducted as part of the project's ESIA. It describes the cultural, demographic, economic, social, and political characteristics of the affected VGs, as well as the characterstics of the land and natural resources within the project area on which VGs depend, and the concerns and expectations raised by the affected VGs. It also provides an assessment of the nature and degree of impacts expected to be felt by the VGs present in the project area, and the identification of measures to ensure that the VGs are involved in culturally-appropriate engagement. For more detail on the content presented in this section, consultation of the project's ESIA Report (Volume II) is proposed.

5.1 Vulnerable groups within the project area

5.1.1 Way of life of the VGs

The project is located in an area that has a low population density and where local communities are primarily the *Mumuila,* who belong to the *Nyaneka-nkhumb* group (ethnolinguistic "Bantu" family). A significant characteristic of this group has been the loss of traditional habits and customs of their culture, now living according to a modern lifestyle, although it is still possible to identify some notable practices of the *Mumuila* tradition in specific areas of the project area. However, the presence of two ethnic minorities, considered by the international community as Indigenous People, the *Mudimba* and the *San,* cannot be excluded.

Mumuila Woman *Muhimba Women* *San Woman*[3]

Figure 5.1: Possible ethnolinguistic groups present in the project area

Polygamy is common practice in these communities, that are traditionally organised according to a matriarchal social system, and are guided by the Traditional Authority (*Soba)*. These community representatives (*Sobas*) have a duty to, *inter alia*, administer and execute customary law of a community; uphold, promote, protect and preserve the culture, language, tradition and traditional values of that traditional community; as well as preserve and maintain the cultural sites, works of art and literary works of that traditional community. They must also represent, mobilise/involve communities and mediate, communicate/disseminate information, and manage the relationship with the municipal and communal administration.

The communities who live in the project area organise themselves mainly as rural settlements, distributed along the watercourses, and it is possible to distinguish two geographical areas:

- In the northern and central parts of the project area (up to Cahama village): the population density is higher and form a concentrated rural settlement. The communities present are mainly engaged

[3] *https://vivimetaliun.wordpress.com, consulted on 2019*

in subsistence agriculture, supplemented by livestock farming (mainly cattle), following a fixed grazing system in the pasture areas surrounding their dwellings (agro-pastoral communities); and

- In the south of the project area (from Cahama to the Namibian border): the population distribution forms a rural settlement, with considerable extensions of sparsely-populated territory. These communities are engaged in livestock farming (mainly cattle) according to a grazing system of transhumance, searching for areas that provide the best resources.

The local communities present in the project area, have no access to electricity and water, and use firewood as their main source of fuel for domestic activities. There are reportedly unsafe sources of surface water for domestic needs and for watering of cattle. Most communities also have limited access to health and education facilities.

Figure 5.2: Example of social environment in the north of the project area

Figure 5.3: Example of social environment south of Cahama village

The peculiar characteristics of the local communities' way of life makes them completely dependent on the natural environment where they live. The woodlands that are present in the project area play an important social functional role. They provide a source of material for the construction of dwellings and a source of firewood for domestic activities, and they also contribute to the diet of the cattle. The small watercourses and "chimpacas" (water reserves fed by rainwater) in the project area are an important resource for the people and their livestock, and the riparian vegetation along these watercourses also forms an important food source for the cattle.

Their dependence on the natural environment also makes local communities extremely vulnerable to climatic extremes (e.g. drought) and food insecurity, as they are considered to be multidimensionally poor (with a significant percentage of them living in severe poverty). This reality tends to be most severe in the pastoral communities, which, in addition to being confronted with less favorable environmental conditions (semi-arid and limited natural resources), are also subject to pressure from the presence of farms (*fazendas*) in the transhumance corridors.






Figure 5.4: Example of natural environment

5.1.2 Land classification

In Angola, all land is state property, classified as Grantable Land (which includes urban and rural land) and Non-grantable Land (land in the public domain of the state as well as community land).

Most of the project area is classified as Community Land (i.e. land used by rural community under a traditional land use system and cannot be bought or sold), bequeathed mainly by the ancestors, thus not being seen as individually owned. It is the responsibility of the *Sobas* to organise and protect community land, to adjudicate land disputes and to allocate land to families or individuals who may not have access to land.

5.1.3 VG expectations

During the meetings conducted during the fieldwork (in April 2019), local community representatives (*Sobas)* were quite active, although not so aware of projects of this nature. The project is generally well received, and positive attitudes toward the project have been confirmed, on condition that certain key issues that affect them, are safeguarded:

- **Involvement**: Communities should be heard when project decisions involve the allocation of land use. Lack of access to electricity is a significant problem in the corridor area, identified both by municipality and communal administrations. It would thus be necessary to clearly communicate which zones will be electrified by the national grid expansion, and which zones would further benefit by distribution infrastructure, and then to implement these plans. For areas not included in the national electrification plan, other compensation should be considered.
- **Compensation**: The communities request to at least benefit from the presence of the infrastructure in their territory, not necessarily related to electricity, but based on lack of water, which is their main concern (primarily due to the current drought). Construction of water infrastructure (both for supplying the communities and for their livestock), can be seen as a significant compensation measure by communities.
- **Communication**: The communities request better communication to facilitate access and to share information, taking into account the linguistic differences and levels of community literacy. Direct meetings/conversations are the preferred communication means to engage people and to convey information to all levels of understanding within the population. The convening of these meetings should be done directly with the Traditional Authority and headmen, who have elected representatives as key contacts. Written communication is a less preferred method of communication.
- **Land occupation**: Even though there is no obvious conflict currently, there is a land occupation issue between Lubango and Cahama, and between cattle owners and large organised farms

(*fazendas*). Fazendas have been occupying transhumance areas/corridors that are used for the seasonal movement of cattle, and limiting available space and routes to water and grazing areas. The project should therefore not place further pressure on these transhumance areas.

5.2 Potential impacts, and mitigation/benefit measures

As a complementary project to electricity production, through which electricity reaches consumers, the project clearly has a positive contribution to national development. This role tends to become more visible, especially in a country such as Angola, where a large part of rural communities do not have access to electricity (recognised as a condition for poverty reduction and improvement of the quality of life). Thus, the project will certainly play an important role in more equitable and sustainable development (Table 5-1), but it is also known that its implementation is not free of impacts, especially in a study area where the local communities are extremely dependent on the natural environment where they live (Table 5-2).

Table 5-1: Potential positive impacts (pre-mitigation)

Potential impact	Duration	Extent	Magnitude	Probability	Significance	VG benefitted
Construction phase						
Job creation	Short term	Provincial	High	Certain	Moderate (+++)	Local communities
Opportunities for local sourcing of goods and services	Short term	Municipal	Moderate	Certain	Minor (++)	Local communities
Operation phase						
Increased availability of electricity	Permanent	International	Extremely high	Certain	Major (++++)	Local communities (in the long run)
Improved safety from demining	Permanent	Limited	Extremely high	Certain	Major (++++)	Local communities
Increased accessibility inside the powerline corridor	Permanent	Limited	Moderated	Certain	Minor (++)	Local communities

Table 5-2: Potential negative impacts (pre-mitigation)

Potential impact	Duration	Extent	Magnitude	Probability	Significance	VG more affected
Construction phase						
Physical displacement as a result of loss of shelter	Permanent	Limited	Extremely high	Certain	Major (----)	Local communities
Economic displacement as a result of loss of land and livelihoods	Permanent	Limited	Extremely high	Certain	Major (----)	Local communities
Economic displacement as a result of loss of natural resources	Permanent	Limited	Low	Certain	Moderate (---)	Local communities
Increased risk of contracting diseases	Short term	Limited	Extremely high	Probable	Minor (--)	Local communities, woman and children
Increased risk of traffic and works accidents	Short term	Limited	Extremely high	Probable	Minor (--)	Local communities, woman and children
Social disruption from construction	Short term	Limited	Extremely high	Probable	Minor (--)	Local communities

Potential impact	Duration	Extent	Magnitude	Probability	Significance	VG more affected
Discomfort caused by construction activities	Short term	Limited	Low	Certain	Minor (--)	Local communities
Gender-based Violence	Short term	Limited	Low	Certain	Minor (--)	Local communities
Operation phase						
Increased risk related to the presence of the transmission line	Permanent	Limited	Extremely high	Probable	Minor (--)	Local communities, children
Opening opportunities for illicit activities	Permanent	Very limited	Extremely high	Likely	Minor (--)	Local communities

Most of the identified impacts have the potential for mitigation through the application of a set of measures, from the detailed design to the operational phase of the project. These measures focus on negative impacts and are proposed to primarily avoid the impact (allowing adjustments to the detailed design of the project). Where this is not possible, the aim of these measures is to minimise (reduce impact significance) or, as a last resort, to compensate for impacts that cannot be avoided or minimised. Where applicable, measures to enhance the positive impacts are also proposed (Table 5-3).

Table 5-3: Proposed mitigation and enhancement measures

Potential impact		Measures	
		Description	Objective
Construction phase			
Job creation	+++	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 transmission line will be given priority for low-skilled jobs. Quotas for local employment should be set based on the availability of appropriate local skills, and this information should be sourced from the municipal and communal authorities by undertaking an independent skills audit at the outset. The quota for local employment must include a minimum of 10% - 5% for women and 5% for men. The contractor's contract should specify that these positions may only be filled by persons outside of these categories if it can be demonstrated that no suitable persons are recorded in the skills register to fill these positions, and that no other candidates could be identified through local advertising. All workers should be adequately trained for the proper performance of their functions; The contractor/s 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 (included in SEP, Annexure A of the ESMP – Vol.III); and 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. 07/2015 of 15 Jun), in the IFC's Performance Standard 2: Labour and Working Conditions, and in the DBSA's ESSS 6: Labour and Working Conditions.	Enhance local job creation
Opportunities for local sourcing of goods and services	++	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. transportation, construction materials from mining operation located in the vicinity of the study area, waste management and disposal, water supply, catering, etc.), to maximise local procurement. This plan should ensure the equal and effective participation of women and men in the procurement board; and The contractor/s 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 (included in the SEP – Annexure A of the ESMP – Volume III).	Enhance opportunities for local sourcing of goods and services
Physical displacement as a result of loss of shelter	----	The number of people/social groups affected is unknown at this stage of the project and will be confirmed during the final design, with a commitment to avoid or minimise physical displacement. For this purpose, and after demining activities have been completed, a detailed social survey of the corridor directly affected by the final alignment, in terms of access, pylon locations and construction camps,	Avoid or minimise loss

Potential impact		Measures: Description	Measures: Objective
		should be undertaken, to avoid where possible, or maximise the distance from existing dwellings. Priority should be given to the use of the existing access roads/ tracks, as well as already-disturbed areas. The access routes, pylon locations, final location of Cahama substation and construction camps, should be determined in agreement with the local *Sobas* and with the people/social groups affected.	
		A Resettlement Policy Framework (RPF) has been prepared as part of the ESIA documentation to guide the preparation of a Resettlement Action Plan (RAP), upon completion of the detailed design. The RAP will guide the resettlement process to ensure that appropriate compensation is provided to the people/social groups that will be directly affected. It will be prepared in line with Angola's legal framework and international lenders' standards for socially-sustainable development (IFC's PS 5 and 7, and DBSA ESSS 4 and 5, related to land acquisition and involuntary resettlement, and Indigenous People). The resettlement should be implemented with a high level of involvement of *Sobas*, affected people/social groups, and local host communities, to ensure that the process is informed by the social and economic needs, constraints and expectations of all involved (included in the SEP, and taking into account an ICP and FPIC of the affected communities).	Compensate for loss
		Provide a Grievance Redress Mechanism for the handling of complaints/requests and collection of information, to be able to consider the need for implementation of new measures. A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances and should be preferably locals and be familiar with the local language and customs.	Minimise and manage loss
Economic displacement as a result of loss of land and livelihoods	----	The total area required, and the number of affected people/social groups, is unknown at this stage of the project and will be confirmed during the final design, with a commitment to avoid or minimise economic displacement. For this purpose, and after the demining activities have been completed, a detailed social survey of the corridor directly affected by the final alignment, in terms of access, pylon locations, Cahama substation and construction camps, should be undertaken to avoid (where possible) and/or minimise the impacts on livelihoods areas. Priority should be given to the use of the existing access roads/tracks, as well as already-disturbed areas. Should there be a need to create new access routes, livelihood resources (e.g. crops or forests) should not be bisected, to avoid fragmentation. The access, pylon locations and construction camp should be defined in agreement with the local Sobas and the people/social groups that use the land, and/or farm owners (*fazendas*).	Avoid or minimise loss
		The RAP process will guide the compensation for loss of livelihoods. Based on the needs of local communities, priority will be given to compensation through the provision of an asset rather than monetary compensation. Due to lack of water, which is their main concern (primarily due to the current drought), the construction of water infrastructure (both for supplying the communities and for livestock) can constitute a significant compensation measure for communities. However, the type of compensation shall be agreed with the Traditional Authority (included in the SEP, to ensure ICP and FPIC of the affected communities).	Compensate for loss
		Provide a Grievance Redress Mechanism for the handling of complaints/requests and collecting information to be able to consider the need for implementation of new measures. A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances and should be preferably locals and be familiar with the local language and customs.	Minimise and manage loss
Economic displacement as a result loss of natural resources	---	The total areas impacted by deforestation are not known at this stage of the project and will be confirmed during the final design, with a commitment to avoid or minimise such economic damage. For this purpose, and after the demining activities have been completed, a detailed social survey of the corridor directly affected by the final alignment, in terms of access, pylon locations, Cahama substation and construction camps, should be undertaken to avoid (where possible) and/or minimise the impacts on transhumance areas. Priority should be given to the use of the existing access roads/tracks, as well as already-disturbed areas.	Avoid or minimise loss
		Apply mitigation measures proposed for the biotic environment, to limit vegetation clearance to the strictly required areas (to be included in the Demining Management Plan).	Minimise loss
		Compensate for the loss of natural resources. According to the needs of local communities, priority will be given to compensation through the provision of an asset rather than monetary compensation. Due to the lack of water, which is their main concern (primarily due to the current drought), the construction of water	Compensate for loss

Potential impact		Measures: Description	Measures: Objective
		infrastructure (both for supplying the communities and for livestock) can constitute a significant compensation measure for communities. However, the type of compensation for losses shall be agreed with the *Sobas* (included in the SEP, to ensure ICP and FPIC of the communities affected).	
		Provide a Grievance Redress Mechanism for the handling of complaints/requests and collection of information, to be able to consider the need for implementation of new measures. A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances and should be preferably locals and be familiar with the local language and customs	Minimise and manage loss
Increased risk of contracting diseases	--	Implement a Health and Safety Management Plan. Given the limited supply of health care in the study area, this plan should include epidemiological control measures to be implemented by the contractor/s on the construction sites to assist the workers and, in this way, avoid pressure on the existing health units. This plan should also include regular screening of communicable and STDs of all workers assigned to the site, a vaccination program to curb diseases responsive to vaccines, as well as to provide protection for workers most exposed to air pollution and noise while working; Promote awareness activities among workers regarding water and hygiene-related diseases and STDs, especially HIV/AIDS and associated code of conduct. See mitigation relating to code of conduct and social disruption; Locate the workers' accommodation in main villages/towns and not in the areas along the corridor, to avoid interactions between workers and communities. Promote awareness activities among local communities (particularly women and girls) about impacts associated with the presence of non-local workers (health impacts, gender-based violence, sexual harassment, as well as the existing legislation relating to sexual harassment and rape, and trafficking in persons). Women from affected communities should be hired and trained to implement awareness-raising activities. Materials can also be designed that can be replicated on other future projects; Avoid the positioning and placement of construction camps within close proximity to schools or locations where there is a permanent presence of young women and/or female children; Provide a Grievance Redress Mechanism for the handling of complaints/ requests, and for gathering information to assess the degree of risk perceived by local communities and consider the need for implementation of new measures. A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances, and should be familiar with the local language and customs; Implement the Waste and Wastewater Management Plans to ensure that potential chemical and biological contamination from construction activities is duly addressed and controlled.	Avoid or minimise
Increased risk of traffic and works accidents	--	Implement a Community Health and Safety Plan, adopting reduced speed limits and with adequate signs to ensure safety and traffic conditions; maintaining access control of construction sites to prevent access to people from the surroundings; Implement the SEP (Annexure A of the ESMP – Volume III), including prior and extended communication of the activities planned (and timeline) and the accesses to be used during the project construction phase, to enable local communities to increase perception and manage risk; Promote awareness activities among local communities (particularly children) regarding the construction risks; Promote awareness activities among workers about the culture, beliefs, habits and lifestyles of the local communities, and define appropriate rules of conduct. The code of conduct should apply to both contractors and RNT staff and should set out the disciplinary and legal implications of certain activities involving local communities; Promote awareness activities among local communities about the presence of non-local workers. Women from affected communities should be hired and trained to implement education and awareness-raising activities. Materials can also be designed that can be replicated on other future projects; Implement the Demining Management Plan prior to construction activities, in consultation with the competent authorities; and Provide a Grievance Redress Mechanism for the handling of complaints/ requests, and for receiving information to assess the degree of interference perceived by local communities and to consider the need for implementation of new measures. A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances, and should be familiar with the local language and customs..	Avoid or minimise

Potential impact		Measures	
		Description	Objective
Social disruption from construction workers	--	Promote awareness activities among workers regarding the culture, beliefs, habits and lifestyles of local communities, and define appropriate rules of conduct. The code of conduct should apply to both contractors and RNT staff and should set out the disciplinary and legal implications of certain activities involving local communities; Implement awareness activities among local communities about the presence of non-local workers. Women from affected communities should be hired and trained to implement education and awareness raising activities. Materials can also be designed that can be replicated on other future projects. Locate the workers accommodation in main villages/towns and not in the areas along the corridor to avoid interactions between workers and communities; Avoid the positioning and placement of construction camps within close proximity to schools or locations where there is a permanent presence of young women and/or female children; Provide a Grievance Redress Mechanism for the handling of complaints/ requests, and for collecting information to assess the degree of interference perceived by local communities and to consider the need for implementation of new measures. A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances, and should be familiar with the local language and customs.	Avoid or minimise
Discomfort caused by construction activities	--	Apply the mitigation measures recommended in the air quality and noise assessments. Implement the SEP, with prior and extended communication of the activities planned (and timeline) and the accesses to be used during the project construction phase, to enable local communities to increase perception and manage the discomfort in their daily lives. Provide a Grievance Redress Mechanism for the handling of complaints/requests and collecting information, to be able to assess the degree of discomfort perceived by local communities and to consider the need for implementation of new measures. A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances, and should be familiar with the local language and customs.	Minimise
Gender-based Violence		Community awareness activities should include for GBV prevention and response, targeting both genders, as well as the Grievance Mechanism and relevant legal instruments in this regard. Awareness of trafficking to be included. Skills audit to be managed independently to reduce chances of exploitation of women in terms of sexual favours to secure jobs. Separate female CLO to ensure women are comfortable reporting GBV-related grievances. Accommodation for non-local workers to be in nearby villages/towns and not near the corridor (and especially schools), to reduce contact with young girls and women. Promote awareness activities among workers about the culture, beliefs, habits and lifestyles of local communities, and rules of conduct. The code of conduct should apply to both contractors and RNT staff and should include the disciplinary and legal implications of GBV. Each employee (including sub-contractors) shall sign the code of conduct. Provide worker transport by bus between the site and accommodation to minimise traffic and limit workers remaining in the area after hours, as well as to ensure women workers do not have to travel after dark, for example. Establish a process within the Grievance Mechanism specifically for the handling of GBV incidents/complaints that provide protection and support for the victim, so that no identifiable information on the victims is stored in the GM, and the victim is referred to service providers for support.	Avoid or minimise
Operation Phase			
Increased availability of electricity	++++	Publicise the importance of the project in the long run (included in the SEP).	Enhance availability of electricity
Increased safety after demining activities	++++	No mitigation measures.	N/a
Increased access inside the powerline corridor	++	No mitigation measures.	N/a

Potential impact		Measures	
		Description	Objective
Increased risk related to the presence of the transmission line	--	Publish a brochure in the local language for community outreach, with dangerous behaviors to be avoided, and correct procedures to follow near the lines (to be included during awareness activities) Women from affected communities should be hired and trained to implement education and awareness raising activities. Materials can also be designed that can be replicated on other similar projects. Erect warning signs in clearly visible locations at each pylon, stating "danger of death" in the local language and including an appropriate symbol for illiterate people, so that it may be understood by all; Anti-climbing devices (as already included in the design) should be installed; A code of conduct should be developed and communicated to any personnel (including contractors) working on the project that sets out disciplinary and legal implications of certain behaviours involving local communitiesMonitor levels of electromagnetic fields.	Avoid or minimise
Opening opportunities for illicit activities	--	Promote awareness activities among local communities about the increased access and about ways to prevent and/or address illicit activities. Women from affected communities should be hired and trained to implement education and awareness-raising activities. Materials can also be designed that can be replicated on other future projects. Provide a Grievance Redress Mechanism for the handling of complaints/requests and for collecting information to consider as to the need for implementation of new measures. A male and female CLO should be appointed to ensure both genders are comfortable reporting grievances, and should be familiar with the local language and customs.	Minimise

If these mitigation measures are duly implemented, the significance ratings of all the negative impacts are reduced to acceptable levels, i.e. the expected impacts post mitigation (residual impacts) are classified as being of negligible to minor significance (Table 5-4).

Table 5-4: Residual impacts (with mitigation)

Potential impact	Potential to Mitigate	Significance	
		Without mitigation	With mitigation
Construction phase			
Physical displacement as a result of loss of shelter	High	**Major (----)**	**Minor (--)**
Economic displacement as a result of loss of land and livelihoods	High	**Major (---)**	**Minor (--)**
Economic displacement as a result of loss of natural resources	High	**Moderate (---)**	**Minor (--)**
Increased risk of contracting diseases	Medium	**Minor (--)**	**Negligible (-)**
Increased risk due to traffic and work accidents	Medium	**Minor (--)**	**Negligible (-)**
Interference in local communities‘ daily lives	Medium	**Minor (--)**	**Negligible (-)**
Discomfort caused by construction activities	Medium	**Minor (--)**	**Negligible (-)**
Gender-based Violence	Medium	**Minor (--)**	**Minor (--)**
Operational phase			
Increased risk related to the presence of the transmission line	Low	**Minor (--)**	**Minor (--)**

Potential impact	Potential to Mitigate	Significance	
		Without mitigation	With mitigation
Opening opportunities for illicit activities	Low	Minor (--)	Minor (--)

6 Mitigation and Enhancement Plan

6.1 Institutional arrangements

The role-players involved in the VGP implementation are presented below:

- **Project Proponent**: SAPP CC commissioned the ANNA Transmission Interconnector Project on behalf of the Angolan *Rede Nacional de Transporte de Electricidade* (RNT);
- **Implementing Agent**: RNT is the entity ultimately responsible for the transmission infrastructure;
- **Transaction Advisor (TA)**: Aurecon has been appointed as the TA for the project by the SAPP Co-ordination Centre (CC);
- **Owner's Engineer**: project construction will be overseen by the Owner's Engineer on behalf of the Implementing Agent. The Owner's Engineer will be accountable for the management of the EPC Contractor on behalf of RNT;
- **Contractor(s)**: Company(ies) designated by the Proponent to undertake project construction and implement the proposed management plans (ESMP, SEP, RAP and VGP);
- **Interested and Affected Parties (I&APs):** I&Aps are regarded as synonymous with stakeholders and include any persons or groups who are directly or indirectly affected by the project, as well as those who may have interests in a project and/or have the ability to influence its outcome, either positively or negatively (VGs, including their traditional authorities, are considered as I&APs);
- **Fund Administrators:** The funds are administered by the DBSA; and
- **Local and Traditional Authorities:** Municipal and communal administrations under which the project falls, as well as *Sobas.*

The preparation of the VGP is the responsibility of Aurecon, and was prepared by Tese as the appointed Social Specialist for the ESIA process. Following the ESIA process (i.e. during project construction), the VGP will be implemented by the Contractor and supervised by the Owner's Engineer on behalf of the Implementing Agent. After project construction (i.e. during project operation), it will be implemented by RNT.

The Owner's Engineer, Contractor (construction) and Implementing Agent (operation) will designate the following responsibilities to a Social Specialist:

- Planning the VGP actions, guiding and assisting team staff that will be contracted for specific actions, to ensure the implementation is undertaken in an efficient manner;
- Communicate with VGs or their representatives; and
- Assist, where necessary, the stakeholder engagement/grievance, RAP and ESMP team.

Before project construction, the Social Specialist will be familiarised with its roles and responsibilities, as well as with the VGs' social and cultural realities.

The contractor, with the support of *Sobas,* will appoint a Community Liaison Officer (CLO) (one female and one male) to ensure communication with, and involvement from, VGs. Specific responsibilities of this CLO include:

- Participating in data collection from the community;
- Awareness creation in the community about the VGP;
- Facilitating meetings with VGs;
- Implementing the VGP at community level; and

- Addressing grievances from VGs.

As the entities responsible for service provision, municipal and communal administrations, with the support of the *Sobas,* will provide institutional support for the implementation of activities under their supervision.

The DBSA has the responsibility to monitor the project's compliance with the ESSS and IFC safeguards.

6.2 Action plan

Some of the measures proposed in Table 6-1 are management requirements to support the project's monitoring during its construction and operation, forming part of the ESMP (Volume III of the ESIA report). Other measures are integrated in the project's Resettlement Policy Framework (RPF), and future RAP. The implementation of these plans is reliant on continuous and consistent stakeholder engagement (as described in the project SEP). Therefore, the measures that form part of this VGP (in the form of a management plan as set out in Table 6-1) should be implemented in close collaboration with the project's ESMP, RAP and SEP.

Table 6-1: Vulnerable Group Action Plan

Potential impact	Action	Applicable project phase				Responsibility	Cost estimate (USD)
		Final design	Pre-construction	Construction	Operation		
Physical displacement as a result of loss of shelter	Detailed social survey	☒	☐	☐	☐	Aurecon	*Cost included in project*
	Prepare RAP	☒	☐	☐	☐	Contractor	*Cost included in RPF*
	Implement RAP	☐	☒	☐	☐	Contractor	*Cost included in RPF*
Economic displacement as a result of loss of land, livelihoods and natural resources	Water Programme (the management of the water infrastructures created should be done by women)	☐	☐	☒	☐	RNT/ Local Authorities	"Chimpaca" Unit price 35 000 USD[4] 315 000 USD Borehole Unit price 80 000 USD[5] 160 000 USD Total **475 000 USD**
Economic displacement as a result of loss of land, livelihoods and natural resources	Demining Management Plan	☐	☒	☐	☐	Contractor	*Cots included in project's construction*
Increased risk from traffic and work accidents		☐	☒	☐	☐	Contractor	
Job creation Opportunities for local sourcing of goods and services	Local Employment Programme (ensure that women, and people who are physically challenged, benefit equally from procurement processes)	☒	☒	☐	☐	Contractor	*Cost included in project's construction*
Increased risk of contracting diseases Increased risk of traffic and work accidents Interference in local communities' daily lives	Community Education and Awareness Programme (Appoint and train women from affected communities to implement education and awareness-raising activities)	☒	☒	☒	☐	Contractor	60.000

[4] As a preliminary approach, the construction of 1 per affected communal administration (9 in total) is proposed - to be reviewed after quantification of affected VGs, within the RAP surveys.
[5] This cost includes geohydrological studies, the construction of boreholes, flow rate tests, pumps and solar panels, and water quality sampling. As a preliminary approach, it is proposed to construct 2 within the corridor - to be reviewed after quantification of affected VGs and communities/settlements, within the RAP surveys.

Potential impact	Action	Applicable project phase				Responsibility	Cost estimate (USD)
		Final design	Pre-construction	Construction	Operation		
Increased risk related to the presence of the transmission line Opening opportunities for illicit activities							
Increased risk of contracting diseases Increased risk of traffic and work accidents Interference in local communities 'daily lives	Workers Education and Awareness Programme	☒	☒	☒	☐	Contractor	*Cost included in project's ESMP*
Increased risk of contracting diseases Increased risk of traffic and work accidents	Health & Safety Management Plan	☐	☒	☒	☐	Contractor	*Cost included in project's ESMP*
Increased risk of contracting diseases	Waste Management Plan	☐	☐	☒	☐	Contractor	*Cost included in project's ESMP*
Interference in local communities 'daily lives	Mitigation measures to mitigate air quality and noise impacts	☐	☐	☒	☐	Contractor	*Cost included in project's ESMP*
Increased risk related to the presence of the transmission line	Placement of a sign in a visible place, at each pylon, indicating "risk of death" in the local language as well as a relevant symbol for illiterate people, so that the message may be understood by all.	☐	☐	☒	☐	Contractor	*Cost included in project's ESMP*
	Electromagnetic Fields Monitoring Plan	☐	☐	☐	☒	RNT	*Cost included in project's ESMP*
Transversal to all potential impacts	Stakeholders Engagement Plan	☐	☒	☒	☐	Contractor	*Cost included in project's SEP*
	Grievance Redress Mechanism	☐	☒	☒	☒	Contractor	*Cost included in project's SEP*
		☐	☒	☒	☒	RNT	*Cost included in project operation*
						Total Cost:	***535 000 USD***

7 Vulnerable Group Engagement

7.1 Participatory planning process

The participatory approach presented in this section provides continuity to the work initiated during the ESIA process, extending VG engagement during the project construction. This approach (consolidated in the project's ESMP and SEP) is directed towards:

- Ensuring that planned actions are approved by VGs, and thus obtain FPIC, which is a specific right now recognised by international law as a legal norm, imposing clear affirmative duties and obligations on States. "*Free*" means that VGs' consent cannot be given under force or threat; "*Prior*" indicates that VGs must receive information on the activity and have enough time to review it before the activity begins; "*Informed"* means that the information must be provided in a language and format understood by the community; "*Consent"* refers to the right of the community to agree, or not, with the project before it begins and for the life of the project; and
- Supporting VGs, by helping them to prepare for, and deal with, change.

VG engagement can be either formal or informal. Informal engagement will occur on a continuous basis through interaction between the contracting team and the VGs during final project design, as well as when the VGP actions are implemented. Formal engagement activities, in contrast, are planned engagements with specific objectives and agendas.

The preferred type of engagement is community meetings (direct meetings/conversations), as was requested during the compilation of this VGP.

7.1.1 Engagement during VGP preparation

As mentioned above, this VGP was designed through a consultative process (meetings) conducted during the ESIA fieldwork, that served to gain a better understanding of local social reality, as well as capture concerns and expectations of affected VGs. As part of the project's ESMP, VGP consultation occurs at two stages: (i) during the public consultation of the ESIA report, and (ii) after the final design (when number and location of affected VGs becomes evident). This engagement activity will be targeted to allow VGs an insight into the predicted impacts and mitigation. This process will further allow VGs the opportunity to confirm that their needs, fears and expectations have been recorded and considered in the specialist investigations.

Table 7-1: Engagement planned during VGP preparation

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
ESIA	Draft VGP	Community meetings (smaller engagements with women will be held after each meeting to enable women to participate fully in the process)	Inform, listen and consult	Disclose Draft VGP and collect inputs to create interest and promote further engagement to encourage participation in the VGP implementation	VGs and VG representatives
		Public meetings			VGs and VG representatives, as well as other stakeholders

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
Final design (*i.e. when number and location of VGs are known*)	VGP updated	Community meetings, site visits and discussions	Inform, listen and actively participate	Validate the final design solution (pylon location, Cahama substation, access routes and temporary camp(s)' location), and validate the updated VGP	VG and VG representatives

7.1.2 Engagement during VGP implementation

Once the VGP is approved, VG engagement during the VGP implementation, will occur at several key stages, as shown in the table below.

Table 7-2: Engagement planned during VGP implementation

Stage	Document submitted	Type of engagement	Participation level	Objective	Participants
Before project construction	VGP approved	Community meetings (smaller engagements with women will be held after each meeting to enable women to participate fully in the process)	Inform/ listen/ consult	VGP announcement and construction activities (schedule, type of activities, risk and precautions)	VG and VG representatives
During project construction	VGP progress report	Frequent community meetings (smaller engagements with women will be held after each meeting to enable women to participate fully in the process)	Inform	VGP progress and construction activities	VG and VG representatives
After project construction	VGP construction report	Community meetings (smaller engagements with women will be held after each meeting to enable women to participate fully in the process)	Inform	Construction completion and VGP results during project construction	VG and VG representatives

7.1.3 Engagement process

VG engagement should take the following process into account:

- **VG identification:** During the final project design, the detailed social surveys that form part of the RAP, will identify the number and location of VGs that will be affected by the project. This information will serve to create a preliminary list of affected VGs (included in the SEP). This list will be updated as a live document throughout the project implementation.
- **Document dissemination**: The information to be communicated will be clear, meaningful, transparent and comprehensible to ensure access to this information. All documents submitted (Table 7-1 and Table 7-2) will be simplified and translated into the local language. Acknowledging that some of the VGs may be illiterate, all documents will also use alternative mediums to illustrate the information, such as posters with pictures and diagrams. Document dissemination will occur at least 20 days prior to the meetings.
- **Notification:** To ensure that the project is communicated as widely as possible, meeting notifications will be distributed and explained by direct communication with VG representatives (face-to-face). These notifications will invite VGs to become involved with the engagement process and provide information on the following: (i) date, time and location of meetings; (ii) meetings' objectives, indicating the topics to be addressed and the speakers; (iii) where they can obtain more information about the project; (iv) how and when they can submit written comments; and (v) opportunities for any interested party to raise issues of concern on the day of the meeting.

  Furthermore, other media streams will be used, as appropriate: (i) site notices placed in the project vicinity (in Portuguese and local language); (ii) public notices erected in strategic areas (municipal and communal administration, markets, etc.); and (iii) radio announcements.

  Notification should occur at least 20 days prior to community meetings.
- **Registration:** All copies, recorded comments, dates and exact locations of actions completed, will be recorded in the Stakeholder Engagement Report.

7.1.4 Gender considerations

Special focus will be given to women, due to their position in Angolan society, in order that they benefit from the proposed project's components. Women in Angola continue to experience pervasive gender and intra-household inequalities. Increasing women's economic activity outside the home has not reduced the volume of unremunerated work required to be done in the home. This contributes greatly to increasing their workload, making it difficult to care for children, amongst other duties.

In addition, in rural areas, women play an important role in agriculture, but the challenges they face are even higher. Firstly, because living conditions are more difficult in a variety of ways, and secondly, because gender differences are even more pronounced (participation in decision-making is still predominantly male and, despite their role in agriculture, women often fulfil secondary roles, remaining silent, and are not encouraged to participate).

Also important are the obstacles faced by women with regards to HIV/AIDS. There is a high concentration of infection in women of childbearing age (over half of the HIV/AIDS cases are found in women), and they are twice-discriminated against by their partners, first as women and then as women with HIV/AIDS (often being banished from their homes). In rural areas, women with HIV/AIDS face additional problems over and above the high incidence of poverty, namely that treatment in the retrovial program is often abandoned, particularly as a result of the poor availability of health services[6].

The construction workforce may include non-local workers and, in this regard, women and girls constitute vulnerable groups, susceptible to potential gender-based violence (GBV). GBV can be defined as (World Bank, 2018):

- Physical violence (such as slapping, kicking, hitting, or the use of weapons);
- Emotional abuse (such as systematic humiliation, controlling behavior, degrading treatment, insults, and threats);
- Sexual violence, which includes any form of non-consensual sexual contact, including rape;
- Early/forced marriage, which is the marriage of an individual against her or his will often occurring before the age of 18, also referred to as child marriage;
- Economic abuse and the denial of resources, services, and opportunities (such as restricting access to financial, health, educational, or other resources with the purpose of controlling or subjugating a person);
- Trafficking and abduction for exploitation; and,
- Intimate Partner Violence (IPV) perpetrated by a former or current partner, includes a range of acts of violence.

Major civil works can exacerbate GBV through the following (World Bank, 2018):

- Projects with a large influx of workers may increase the demand for sex work - even increase the risk for trafficking of women for the purposes of sex work - or the risk of forced early marriage in a community where marriage to an employed man is seen as the best livelihood strategy for an adolescent girl. Furthermore, higher wages for workers in a community can lead to an increase in transactional sex. The risk of incidents of sex between laborers and minors, even when it is not transactional, can also increase.
- Projects create changes in the communities in which they operate and can cause shifts in power dynamics between community members and within households. Male jealousy, a key driver of GBV, can be triggered by labour influx on a project when workers are believed to be interacting with community women. Hence, abusive behaviour can occur not only between project-related staff and those living in and around the project site, but also within the homes of those affected by the project.
- When land redistribution occurs, for example due to resettlement for civil works, women may be extremely vulnerable to GBV. This is particularly true in countries where the legal systems preclude women from holding land titles.

Women and girls' job opportunities are limited due to a lack of appropriate transportation options. When creating job opportunities for women within projects, teams should be aware that traveling to and from work in some settings can force women and girls to use unsafe, poorly lit commuter routes, or unsafe public transport. Increased risk of violence is experienced when women are confronted with traveling long distances to access work opportunities or forced to travel at night.

During the ESIA disclosure, a special request will be made for women to attend meetings. Where possible, a female facilitator will be included in the meetings, and smaller meetings will be held with

[6] European Union (2014). Diagnóstico de Género de Angola. PAANE II – Programa de Apoio aos Actores Não Estatais.

women after community meetings (where time allows) to enable women to fully participate in the ESIA process. A meeting is also planned to be held with the regional delegation of the Ministry of Social Action, Family and Women Promotion, to record the challenges that women in the study area experience. Figure 7.1 provides an illustration of how women should be considered and included throughout the project's stakeholder engagement process.

As previously mentioned, the Namibian component of the ANNA Project has already undertaken a set of stakeholder engagements as part of its legal ESIA process, and some pertinent issues related to gender and social matters concerning vulnerabilities that should be taken into consideration for future stakeholder engagement activities during the next project stages.

- The overall region presents high levels of unemployment and a lack of skills. A dedicated training programme, to ensure that the local population are enabled, must be implemented. Tailored technical assistance for women and other vulnerable groups, including the acquisition of the specialised technical skills required for this project, must be catered for. Project activities, such as the RAP survey, should employ and capacitate locals to fulfil the specific needs of these activities.
- Create awareness in both men and women, on how they can benefit from the project in order to become economically empowered.
- Corruption and nepotism in the allocation of jobs requires attention to ensure that no person is favoured due to their gender or ethnic group. The job allocation process must be transparent and independent. A large number of women are the heads of households, and it is therefore important for women to also benefit from project-related employment. The development of the Local Employment Plan (for the construction phase) must include:
  - The implementation of Affirmative Action as one of its requirements.
  - A defined quota stating the percentage of women and men that will be employed on the project.
  - Both women and men from the settlements along the transmission line should be given priority for low skilled jobs by taking into account in the project document, and explicitly indicating, the quota for each gender.
  - A skills audit must occur before any construction activities commence, and notification of this provided via the local administrations and traditional heads, undertaken by independent consultants to ensure a transparent and independent process.
  - Special attention is required to prevent, or manage, unwanted pregnancies, especially when minors are involved:
  - Reports of unwanted pregnancies relating to construction workers, especially when the workers are from outside the project area, reinforces the need to use local workers where available.
  - An increase in teenage pregnancies caused by construction workers, who are known to target schools, can also occur and, as such, these age groups should be specifically targeted in training sessions.
  - As these problems only become evident after a certain period of time, often only once construction is complete, it is frequently difficult to find and/or take action against the specific worker (e.g. underage women and women with unwanted pregnancies usually do not have any source of support, and the father should be equally accountable). Actions should be put in place to prevent these situations, as unwanted pregnancies lead to the increased vulnerability of an already-vulnerable group of people (i.e. unsupported women, who are unemployed, now have the additional burden of a child with no father, and children born with no father can be stigmatised).

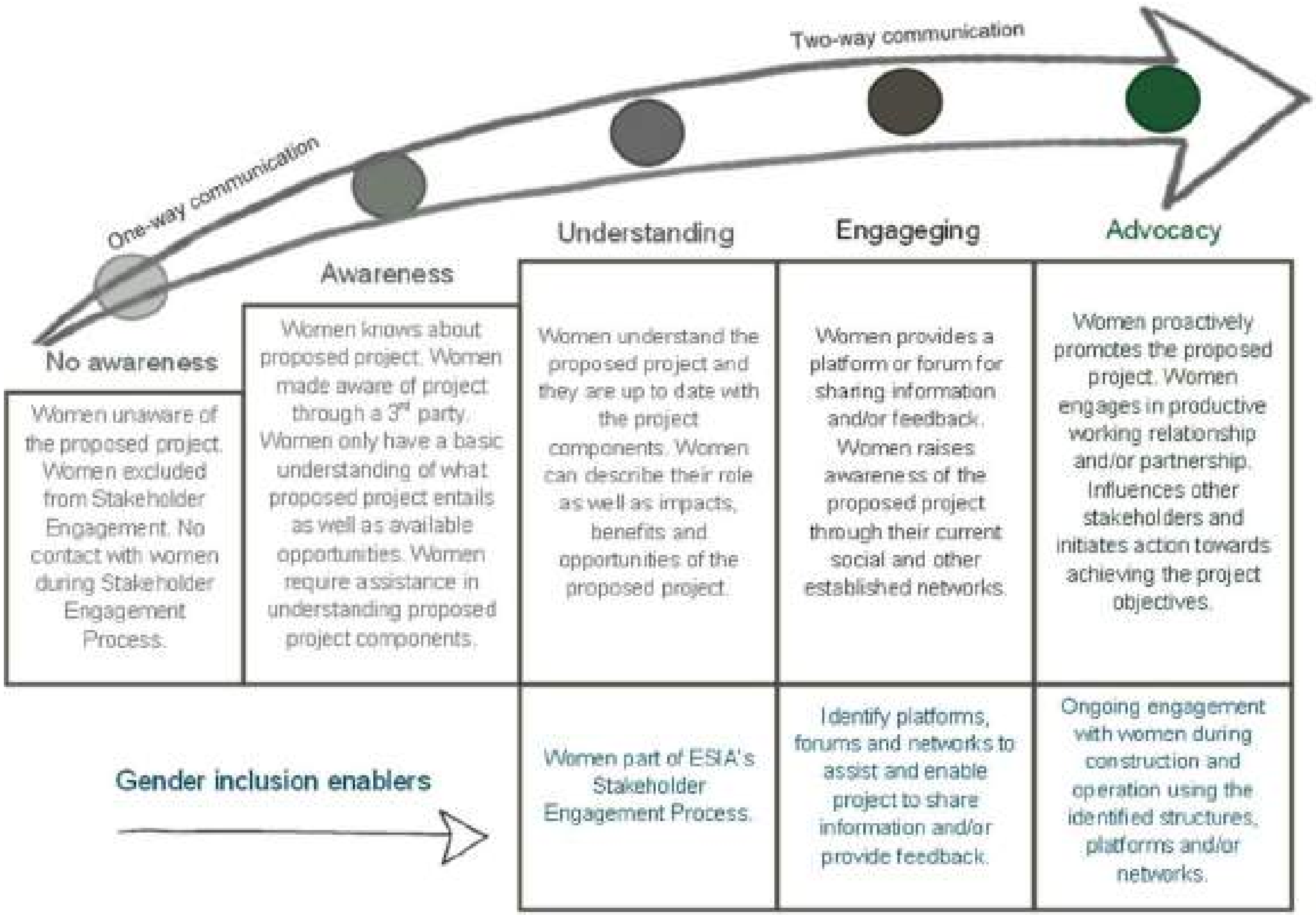


Figure 7.1: Gender consideration during stakeholder engagement

- The construction camp(s) must be located away from schools and locations where women, and especially minors, often gather, such as markets, churches, etc.
- The Code of Conduct must include rules for engaging with locals, especially with underage girls. The disciplinary and legal implications for non-compliance with the Code of Conduct should be emphasised, for example dismissal or legal action if a rule is contravened (such as engaging with minors).

- The related risk of HIV/AIDS may not be accepted as a valid risk by the local communities and is sometimes associated with witchcraft practices. Dedicated awareness sessions to expand the communities' knowledge, and acceptance, of these issues, as well as increase their awareness of the risks, must be implemented.
- During construction, gender-based violence (GBV) is a possibility due to the presence of a non-local workforce and, as such, the project must ensure that all measures to prevent this are put in place. This includes the creation of an incident register, of incorporating dedicated GBV actions into the Grievance Mechanism (such as the protection of the anonymity of the victim), and making provision for the application for immediate disciplinary and legal actions to be taken upon the identification of such an occurrence. This also includes creating awareness amongst men to foster support of women who will be involved in the project, as well as about sexual harassment of both genders, including awareness of existing legal instruments on sexual harassment and rape.
- Rural populations (and specifically indigenous people), often do not send their children to school as per customary practices, and future engagement should therefore also address this issue.
- Villages are spatially dispersed and when a meeting is held, people from remote areas, and more specifically women, may not be able to travel to attend. It is therefore very important to consider and accommodate these challenges when planning engagement logistics.
- Where there are social workers and/or NGOs already operating in the area, the project should revert to their support and knowledge.
- Cultural obstacles may be encountered in the free expression of opinions, for example women may not speak in the presence of men, and may not disagree with them, or marginalised groups such as indigenous peoples or other minorities may not be able/allowed to convey their concerns. The importance of engaging separately with these groups must be considered.
- The Project should put in place measures to ensure that women contribute and benefit from the economic activities of the project. This includes the development of a Local Procurement Plan (for the construction phase) that considers how women-owned businesses will benefit from the procurement processes. This Plan should also ensure the equal and effective participation of women and men of the Procurement Board.
- The walk-down to identify sensitive resources for avoidance or compensation that is to be undertaken by social, heritage and ecology specialists, should include representatives from local communities who can advise on the locations of such resources. This will reduce impacts and also create a sense of inclusion and ownership of the process.
- The CLO to be appointed, should include a female and a male, both indigenous if possible.

7.2 Grievance Redress Mechanism

The participatory process will be essential for the implementation of an effective VGP. However, having a formal Grievance Mechanism provides an additional supportive procedure to ensure that VGs have access to find solutions to their problems. In addition to indicating that the project is in line with its human rights responsibilities, a commitment to an appropriate Grievance Mechanism will increase the trust of affected VGs and reduce impacts on them.

Although it is essential to implement this mechanism during project construction, it is equally important that it extends into the operational phase of the project.

A Grievance Redress Mechanism (GRM) refers to a complaint instrument through which project-affected persons and communities may raise their concerns to the project developer and find ways through which these grievances could be addressed.

This project's GRM was designed based on the following United Nations Guiding Principles on Business and Human Rights (UNGPs) criteria, to measure its practicality and performance:

- **Legitimate:** Enabling trust from the stakeholder groups for whose use they are intended, and being accountable for the fair conduct of grievance processes. The GRM will be credible in the eyes of its intended users, so that people trust and use it. Users should be confident that if they lodge a complaint, it will be treated in a fair and objective manner. Both the process and its outcomes are important for establishing trust in the mechanism;
- **Accessible**: Being familiar to all stakeholder groups for whose use they are intended, and providing adequate assistance to those who may face particular barriers to access. The mechanism will be made known to all affected stakeholders, regardless of language, gender, age, literacy level or socio-economic standing;
- **Predictable**: Providing a clear and known procedure, with an indicative time frame for each stage, and clarity on the types of processes and outcomes available, as well as the means for monitoring implementation;
- **Equitable**: Ensuring that aggrieved parties have reasonable access to sources of information, advice and expertise necessary to engage with the grievance process. Equitability also implies handling every grievance consistently, and with due respect for the complainant;
- **Transparent:** Keeping parties with a grievance informed about its progress, and providing sufficient information about the mechanism's performance to enable confidence to be instilled about its effectiveness, and to meet any public interest that may be at stake. It is important for the complainants to understand the timelines for the ensuring steps in the procedure, how the complaint will be handled, and the types of remedies the project can, or cannot, provide. Transparency will also need to respect confidentiality and avoid exacerbating tensions between different groups;
- **Rights-compatible**: Ensuring that outcomes and remedies accord with internationally recognised human rights. The GRM will not be a substitute for, or undermine, a complainant's right to pursue other avenues of remedy, judicial or non-judicial; and
- **Continuous learning:** Drawing on relevant measures to identify lessons for improving the mechanism and for preventing future grievances and harm. The GRM will contribute to institutional learning by making it possible for the project contractor/ Proponent to identify trends and patterns, and to take appropriate measures to reduce the risk of recurrences.

7.2.1 Terminology and definitions

The GRM uses the following definitions:

- **Complainant**: An individual, community group or organisation that submits a verbal or written complaint against the project or contractor;
- **Complaint or grievance**: Any expression of dissatisfaction with the project/contractor activities that the complainant requires attention to be given to and potentially to resolve. Grievances usually refer to actual, or perceived, specific incidents, damage or impact;
- **Dispute**: A point of disagreement between the project and one or more aggrieved parties; and
- **Concerns or issues**: These can be defined as questions, comments, requests for information, or general perceptions that may, or may not, be related to a specific impact or incident. If not addressed satisfactorily, concerns may become complaints.

7.2.2 Disclosure and raising awareness of Grievance Redress Mechanism

For the GRM to work effectively, the process must be known by potential complainants and considered legitimate by them. The GRM, and avenues for lodging a complaint, will therefore be widely publicised within the project area.

During the construction phase, the contractor will erect a project signboard where at the location in which they are working, and maintain it throughout the construction period. The sign shall contain the relevant emergency telephone numbers and email address where specific site project staff can be reached, and where grievances may be lodged. Because many VGs are not able to read or write, the mechanism will be also communicated verbally at community and public meetings, during the community engagement associated with the project activities, to ensure that processes, decisions and outcomes are thoroughly understood. During the operational phase, RNT will erect a project noticeboard at conspicuous locations along the servitude, or in public places in settlement areas along the route, providing the contact details (telephone and email) where grievances may be lodged.

Over time, an evaluation of the effectiveness of the grievance procedure will be undertaken. No complaints is usually a bad sign, as it is more likely to mean that the community do not believe that filing a complaint leads to any action or they may be unaware that such a procedure exists.

7.2.3 Grievance management process

The GRM follows the steps presented below, beginning with the receipt of the complaint and ending with its resolution or close-out.

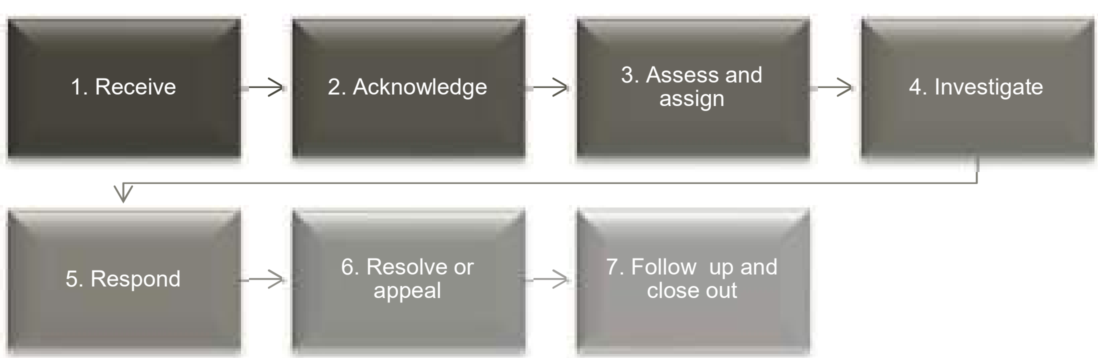


Figure 7.2: Grievance mechanism

1. Receive

Complaints may be lodged verbally, in person or through a trusted representative (face-to-face or by phone), or in writing (letter or e-mail), through any of the following channels:

- CLO (during project construction and operation);
- Contractor's local office, in project area (during project construction);
- RNT local office branches (during project operation); and
- DBSA Grievance Manager: Libby Dreyer, Tel: +27 82 888 6258 / +27 11 313 3507,

  E-Mail: libbyd@dbsa.org; or

https://www.dbsa.org/EN/About-Us/ContactUs/Pages/default.aspxThe concerns or grievances must be genuine and be raised without malice and in good faith. When reporting a concern or grievance it is important that the complainant provide sufficient information that will enable thorough investigation. When a verbal or written complaint is received, the Community Liaison Officer (CLO) records these in the complaints form with as much detail as possible (date, time, name, contact details, preferred means of contact, nature of grievance or complaint) and forwards it to the complaints co-ordinator. The complaints co-ordinator assigns it a unique registration number and captures the complaint in the complaints database. **2. Acknowledge**

Once a complaint has been registered, complainants should receive a timely acknowledgement that their case is in the system. The complaints co-ordinator prepares a letter of acknowledgement of receipt, and the CLO delivers the letter to the complainant or his/her representative (face-to-face) and verbally explains the next steps and their timeframes. When delivery of a letter is not possible, the acknowledgement should be in another culturally-appropriate manner (for example in person).

Acknowledgement will take place within 24 - 48 hours of the complaint being received and acknowledgement of receipt of the concern and/or grievance will be communicated to the complainant through email and/or in writing.

3. Assess and assign

The complaints co-ordinator undertakes preliminary screening of the complaint to determine whether: (i) it is a complaint (and not a concern or issue); (ii) the complaint is related to the project activities or whether it needs to be referred to another party; or (iii) the complaint involved an allegation about a human rights violation or possible criminal activity. Grievances outside the GRM scope should be referred to an appropriate office/level for addressing via different processes.

The level of severity can help to quickly identify the required appropriate action to address the grievance in proportion to its potential impact. The grievances can be classified as “low”, “moderate” or “high”.

Conducting a rapid assessment (within 24 – 48 hours) can assist in satisfactorily addressing smaller issues, to prevent them from escalating. It may also negate the need for investigation, and the complaint may even be closed out. Many complaints can be addressed quickly by the complaints co-ordinator. However, if assessment indicates that the complaint is complicated, or that the facts are less clear, a field investigation will be initiated to provide evidence for analysis and support of the resolution, and to enable the complaint to be assigned to an appropriate department with the relevant technical expertise to conduct the investigation, or one that is associated with the complaint.

4. Investigate

Depending on the nature of the complaint, the investigation may need to involve specialists, who should take steps to build confidence in the community of the fact-finding process, by the following means:

- An investigation will be conducted as speedily as possible and the outcomes / action plan communicated to the complainant within three weeks (15 working days);
- Ideally, investigators should meet face-to-face with the complainant. The investigation team could encourage complainants to be accompanied by their representative;
- Consider using interpreters to avoid misunderstandings;
- Document the facts: The investigation team should prepare a succinct report on investigation findings. All information gathered should be maintained and/or logged to ensure that the response is fully documented; and
- Ensure co-ordination with the investigation team and the complainant: Throughout the investigation process, complainants should be kept informed of progress. If a response is unable to be provided within an agreed period, an updated time frame should be provided.

5. Response

The grievance investigations will be reviewed at monthly project meetings and will remain active until resolved and an official response is provided to the aggrieved. The outcome of the investigation will inform whether:

- The complaint is found to be unrelated to the project. In this case, the complainant is informed (other avenues can be suggested) and the complaint is recorded as closed;
- There is evidence to prove that the complaint is false, in which case the complainant is informed of the investigation's findings and the complaint is recorded as closed;
- Complaint is found to be unsubstantiated, in which case the complainant is informed of the investigation's findings and other possible avenues could be recommended;
- The complaint requires resolution options. It is important to verify that the proposed resolution addresses the root cause of the grievance, to minimise the chance of recurrences. It is also important to check whether the proposed resolution is in line with the complainant's human rights, and that, in solving the complainant's grievance, another person's rights are infringed upon.

  In some cases, the proposed resolution should be discussed with the complainant rather than unilaterally announcing the verdict. The complainant should have an opportunity to accept or reject the proposition, or offer an alternative for discussion. Dialogue and negotiation should take place on an equal power base (i.e. the complainant should be allowed to bring their representative to accompany them during discussions regarding the response to the investigation). If the response is rejected, another resolution process may be required.

  The final agreement should be made both verbally and in writing. It must be specific, time bound, agreed upon by both parties and generally remain confidential. However, the complainant themselves may choose to make the outcome public.
- Where feedback within three weeks (15 working days) is not possible, the person, community of project stakeholder will be notified of the reason of the delay.

The DBSA Stakeholder Engagement and Information Disclosure Standard (ESSS 2) makes provisions for circumstances where a complainant is unable to obtain an adequate response. In this case, the complainant should bring their concerns directly to the DBSA's attention, following the procedures outlined on their website[7]. These procedures should be shared with stakeholders so that they can follow the correct approach, should the situation arise, and will form part of the Grievance Plan.

6. Resolve or appeal

The GRM should consider a recourse or appeals mechanism for complaints where the complainant and the project cannot reach agreement. If access to a judicial process is complex, excessively costly or unavailable, the project and the complainant may mutually agree to negotiation, facilitated by a neutral third party (mediation professional or organisation, an NGO, a lawyer or other respected local, national or international figure). This neutral third party will be agreed upon between the project and the complainant or aggrieved parties. Findings will be non-binding to either party and they will not preclude either party from pursuing legal action.

7. Follow up and close out

Once a resolution has been agreed upon, or a decision has been made, the response must be implemented and monitored (adjustments may be necessary to ensure that the root cause/s of complaints are addressed and that outcomes are consistent with the intention of the original agreement concluded with the complainant).

Grievance close-out occurs after the implementation of an agreed resolution has been verified. Results must be documented, and the parties' evaluation of the process must be requested (close-out form). Even if an agreement is not reached, it is still important to close the case.

Conducting a follow up and close out can assist in maintaining the complainant's trust. It is suggested that implementation of the response and the complaint close-out, occur within thirty days of the complaint being received.

[7] http://www.dbsa.org/EN/InvestorRelations/Pages/Sustainability.aspx

8 Monitoring and evaluation plan

This section describes the Monitoring and Evaluation Plan that will be undertaken as part of the VGP implementation.

Monitoring and evaluation will strengthen the contractor's ability to ensure the effectiveness, efficiency and relevance of actions to be implemented, facilitating: (i) the timely introduction of corrective and adjustment measures, and ii) the evaluation of the impacts of actions/activities. It will also support the contractor in understanding the most efficient way to solve problems and achieve objectives, i.e. how to improve the performance of the VGP.

8.1 Monitoring objectives

VGP monitoring must, as an objective, verify that:

- Actions and commitments described in the VGP are implemented fully and on time;
- VG programs remain aligned with DBSA and IFC requirements and, where non-compliances are identified, timely and effective corrective actions are undertaken;
- Actions are effective in achieving outcomes consistent with those defined in the VGP (i.e. broadening socio-economic benefits generated by the project, compensating affected VGs for potential loss of natural resources, and ensuring VG engagement);
- Complaints lodged by VGs are followed up on and, where necessary, appropriate corrective actions are implemented; and
- Regular progress reporting occurs to keep project management, affected VGs and other interested stakeholders, appropriately informed about VGP progress and issues.

8.2 Performance indicators

VGP monitoring presupposes the development of a set of indicators (quantitative or qualitative), which allow the evaluation of the implemented actions. The indicators are divided into input, output and outcome indicators (Table 8-1):

- **Input (or progress) indicators**: Measure whether inputs are being delivered in accordance with the schedule, and as defined in the VGP. Inputs are services, resources or goods that contribute to achieving outputs and, ultimately, desired outcomes;
- **Output (or performance) indicators**: Measure the direct results of inputs; and
- **Outcome (or impact) indicators:** Evaluate the effectiveness of VGP inputs and outputs in achieving the objectives of the VGP. Outcomes are usually not immediately evident.

Table 8-1: Vulnerable groups monitoring plan

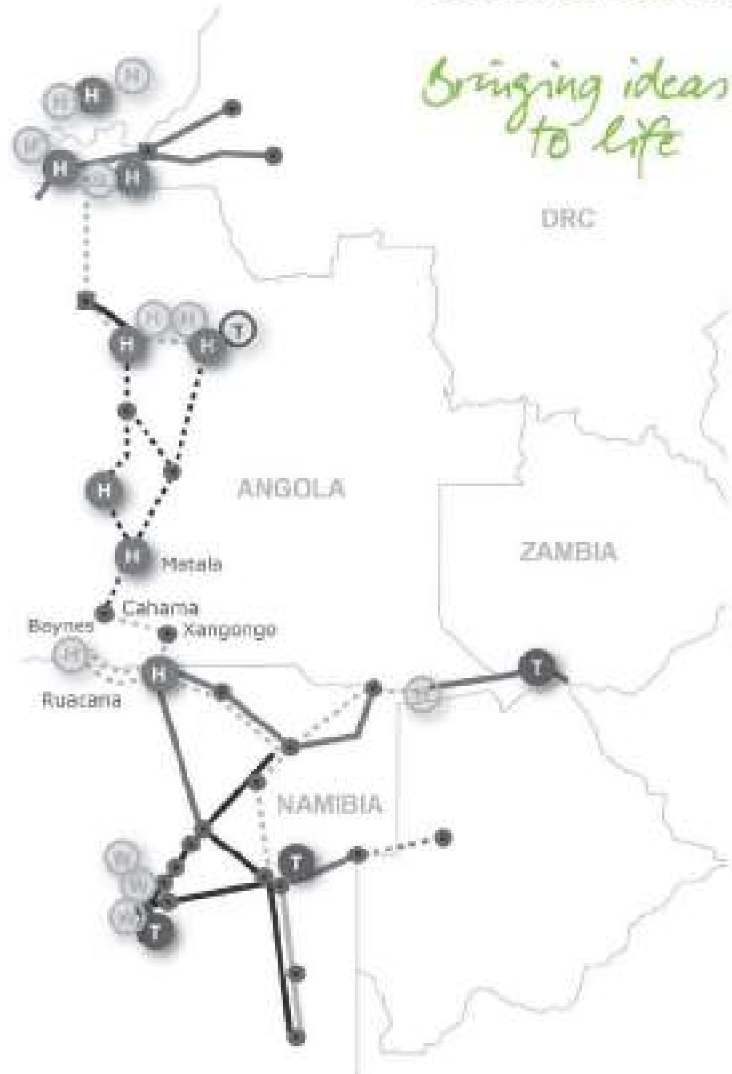
Action	Indicator	Verification means	Monitoring frequency
VGP implementation	N.º human resources of VGP team	Contracts	Quarterly
	N.º VGP actions implemented (Table 6.1)	Progress report	Quarterly
	Budget spent on VGP implementation	Progress report	Quarterly
	N.º VG engagement activities related to VGP	Registration Sheets	Monthly
	N.º Complaints received related to VGP	Complaints form	Monthly

Action	Indicator	Verification means	Monitoring frequency
Local employment programme	Means used to publicise the programme	Announcements; CLO Meeting registration sheets	Quarterly
	N.º VG employees (by gender)	Contracts; Employee's registration sheets	Quarterly
	Satisfaction level of VG employees	Satisfaction survey	Biannual
Water programme	N.º water infrastructure built	Progress report	Quarterly
	N.º VG benefitted	Progress report	Quarterly
	Satisfaction level of water users	Satisfaction survey	Biannual
Community Education and Awareness Programme	N.º education and awareness activities performed	Education and awareness registration sheets	Quarterly
	N.º participants in activities (by gender)	Education and awareness registration sheets	Quarterly
	VG understanding of the risks associated with the presence of non-local workers	VG survey; Education and awareness registration sheets	Quarterly
	VG understanding of the risks associated with machinery and operation of vehicles and equipment	VG survey; Education and awareness registration sheets	Quarterly
	VG understanding of the behaviours they need to put into practice to avoid risk	VG survey; Education and awareness registration sheets	Quarterly
	N.º accidents related to project activities	VG survey; Complaints form	Quarterly
	N.º conflicts between project workers and VG	VG survey; Complaints form	Quarterly
	N.º new cases of diseases (sexual and contagious diseases) and unwanted pregnancies identified during project construction	VG survey; Complaints form	Quarterly
VG engagement	N.º participants in engagement activities related to VGP (by gender)	Engagement registration sheets	Quarterly
Grievance redress mechanism	VG understanding of avenues and steps for expressing a grievance	Engagement registration sheets	Quarterly
	N.º complaints (related to VGP) resolved satisfactorily	Complaints form; Complaint close-out form	Quarterly

8.3 Report

The results of the VGP actions will be reflected in quarterly Progress Reports. These reports will allow quantification and verification of indicators, as well as for the VGP evaluation. The contactor/RNT will prepare bi-annual monitoring reports to submit to SAPP CC/DBSA for review.

Annexure C: Resettlement Policy Framework (RPF)



ANNA

TRANSMISSION PROJECT

ANNA TRANSACTION ADVISORY SERVICES

Environmental and Social Impact Assessment

Angola

Volume III - Environmental and Social Management Plan

Annexure C: Resettlement Policy Framework (RPF)

March 2020

Definitions

Term	Definition
Resettlement Action Plan (RAP)	The document in which a project proponent specifies the procedures that will follow and the actions that it will take to mitigate adverse effects, compensate for losses, and provide development benefits to persons and communities affected by a project.
Community	A group of individuals broader than a household, who identify themselves as a common unit due to recognised social, religious, economic or traditional governmental ties, or through a shared locality.
Compensation	Payment in cash, or in kind, for an asset or resource that is acquired or affected by a project at the time that the asset needs to be replaced.
Cut-off date	The date of completion of the census and assets inventory of persons affected by a project. Persons occupying a project area after the cut-off date are not eligible for compensation and/or resettlement assistance. Similarly, fixed assets (such as built structures, crops, fruit trees and woodlots) established after the date of completion of the assets inventory, or an alternative mutually agreed upon date, will not be compensated (IFC, 2002).
Displacement assistance	Support provided to people who are physically displaced by a project. Assistance may include transportation, shelter, and services that are provided to affected people during their move. Assistance may also include cash allowances that compensate affected people for the inconvenience associated with displacement and defray the expenses of a transition to a new locale, such as moving expenses.
Economic displacement	Loss of income streams or means of livelihood resulting from land acquisition or obstructed access to resources (land, water or forest), which results from the construction or operation of a project, or its associated facilities.
Economically-displaced households	Households whose livelihoods are impacted by a project, which can include both resident households and people living outside the project area, but having land, crops, businesses or various usage rights inside a project area.
Eligible crops	Crops planted in this project's moratorium area, by project-affected people, prior to the moratorium date, and that are eligible for compensation in accordance with this RPF.
Eligible land	The land (cropped and fallow, agricultural and communal) within this project's moratorium area that is eligible for compensation in accordance with this RPF.
Eligible structures	The buildings and structures constructed within this project's moratorium area prior to the moratorium date, and that are eligible for compensation in accordance with this RPF.
Homestead	Stand on communal/traditional authority land, allocated to an individual or household, on which the latter has built a residential structure and possibly one, or more, outbuildings. The perimeter may be enclosed by a fence.
Host community	People living in, or around, areas to which people, who are physically displaced by a project, will be resettled to, and whom, in turn, may be affected by the resettlement.
Household	A person or group of individuals living together, in an individual dwelling, who share cooking and eating facilities and form a basic socio-economic and decision-making unit.
International Finance Corporation (IFC)	A division of the World Bank Group, that provides investment and advisory services to private sector projects in developing countries, with the goal of ensuring that all people benefit from economic growth.
Involuntary resettlement	Resettlement is involuntary when it occurs without the informed consent of the displaced persons, or if they give their consent without having the power to refuse resettlement.
Livelihoods programs	Programs intended to replace or restore quality of life indicators (education, health, nutrition, water and sanitation, income), and maintain or improve economic security for project-affected people, through the provision of economic and income-generating opportunities, including, but not limited to, activities such as training, agricultural production and processing, and small and medium enterprises.
Moratorium area	The area in the project area required as a zone for project activities, namely permanent servitudes, servitudes for surface infrastructure, and temporary work areas. All eligible buildings, crops, and land within this area at the time of the moratorium date will be eligible for compensation, according to the terms of this RPF.
Moratorium date	The date on which the moratorium is declared. Persons moving into the project area after this date are not eligible for compensation and/or resettlement assistance. Similarly, fixed assets (such as structures, crops, fruit trees and woodlots) established after the date will not be compensated for.
Performance Standard 5	The IFC's Performance Standard on Involuntary Resettlement, which embodies the basic principles and procedures that underlie the IFC's approach to involuntary resettlement associated with its investment projects and stands as the benchmark against which resettlements are measured.
Physical displacement	Loss of shelter and assets resulting from the acquisition of land associated with a project that requires the affected person(s) to move to another location.

Term	Definition
Physically-displaced household	Households who normally reside in a project area, and who will lose access to shelter and assets as a result of the acquisition of land associated with a project, that requires them to move to another location.
Project area	The project area is covered by the moratorium area and its immediate surroundings.
Project-affected household	All members of a household, whether related or not, operating as a single socio-economic and decision-making unit, who are affected by a project.
Relocation	A process through which physically-displaced households are provided with a one-time lump sum compensation payment for their existing residential structures and their move from a project area.
Replacement value	Replacement value for *land* is the pre-project or pre-displacement (whichever is higher) market value of land of equal productive potential or use, located in the vicinity of the affected land; plus, the cost of preparing the land to levels similar to those of the affected land; plus, the cost of any registration fees and/or transfer duties. Replacement cost for *structures* is defined as the market cost of the materials to build a replacement structure with an area and quality similar to, or better than, those of the affected structure, or to repair a partially-affected structure; plus, the cost of transporting building materials to the construction site; plus, the cost of any labour and contractor's fees; plus, the cost of any registration fees and/or transfer duties.
Resettlement	A process through which physically-displaced households are provided with replacement plots and residential structures at a designated site. Resettlement includes initiatives to restore and improve the living standards of those being resettled.
Resettlement-affected household	Any household that will be affected by land acquisition as a result of a project; this includes physically-displaced and economically-displaced households. In other words, it comprises all those households who either reside, have an asset or structure within, or make use of land that intersects any of a project's servitudes.
Resettlement policy framework (RPF)	A resettlement policy framework is required for projects with sub-projects or multiple components that cannot be identified before project approval. This instrument may also be appropriate where there are valid reasons for delaying the implementation of the resettlement, provided that the implementing party provides an appropriate and concrete commitment for its future implementation. The policy framework should be consistent with the principles and objectives of ESS5.
Speculative building	The erection of buildings or structures, or planting of crops within a moratorium area, with the sole aim of claiming compensation from a project's proponent. Speculation may be pre-moratorium (occurring prior to a moratorium date) or post-moratorium (occurring after a moratorium date).
Stakeholders	Any and all individuals, groups, organisations, and institutions interested in, and potentially affected by, a project, or having the ability to influence a project.
Tenant	A person who lives in a structure belonging to another, regardless of whether they pay rent or not.
Traditional authority	A person who assumes a leadership role by virtue of his/her community's tradition or custom.
Vulnerable household	A household who, by virtue of gender, ethnicity, age, physical or mental disability, economic disadvantage, or social status may be more adversely affected by resettlement than others, and who may be limited in their ability to claim, or take advantage of, resettlement assistance and related development benefits.

TABLE OF CONTENTS

List of Figures

List of Tables

ABBREVIATIONS

Abbreviation	Definition
AAAC	All-Aluminium Alloy Conductor
AC	Alternating Current
ACSR	Aluminium Conductor Steel Reinforced
AIDS	Acquired Immune Deficiency Syndrome
AML	Lubango Municipal Administration (Administração Municipal do Lubango)
ANNA	Angola-Namibia Interconnector Project
ANR	National Waste Agency - Agência Nacional de Resíduos
BAU	Business as Usual
BCE	Before the Common Era
BESS	Battery Energy Storage System
°C	Celsius
CBD	Convention on Biological Diversity
CCS	Carbon Capture and Storage
CE	Common Era
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COP	Conferences of the Parties
DAI	Direct Area of Influence
DBSA	Development Bank of Southern Africa
DoD	Depth of Discharge
DNPAIA	Direcção Nacional de Prevenção e Avaliação de Impactes Ambientais - National Direction for Prevention and Assessment of Environmental Impacts
DRC	Democratic Republic of Congo
EBRD	European Bank for Reconstruction and Development
ECB	Electricity Control Board
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
EL	Environmental Licence
EMF	Electromagnetic Field
ENDE	National Electricity Distribution Company
ENSO	El Niño–Southern Oscillation
EO	Environmental Officer
EPC	Engineering, Procurement, Construction
EPFI	Equator Principles Financial Institution
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESSS	Environmental and Social Safeguard Standard
EU	European Union
Ex	Extinct Species
FACTS	Flexible AC transmission systems
FI	Financial Intermediary
FNLA	National Front for the Liberation of Angola
FPIC	Free, Prior and Informed Consultation
GCM	Global Climate Models
GEF	Global Environment Fund
GHG	Greenhouse Gas
GIS	Geographic Information System
GM	Grievance Mechanism

Abbreviation	Definition
GRAE	Angola's Revolutionary Government in Exile
GWP	Global Warming Potential
ha	Hectare
HDPE	High-density polyethylene
HIV	Human Immunodeficiency Virus
HVAC	Heating, Ventilation and Air Conditioning
HVDC	High Voltage Direct Current
IAI	Indirect Area of Influence
I&AP	Interested and Affected Party
IBA	Important Bird Area
ICP	Informed Consultation and Participation
IFC	International Finance Corporation
INDC	Intended Nationally Determined Contribution
INRH	National Institute of Water Resources of Angola
IP	Indigenous People
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IRP	Integrated Resource Plan
ISO	International Standards Organization
IUCN	International Union for Conservation of Nature
km	Kilometre
kT	Kilo Tonnes
kV	Kilovolt
LIDAR	Light Detection and Ranging
LLSU	Large Livestock Stock Units
L&FS	Life and Fire Safety
LSA	Later Stone Age
LVIA	Landscape and Visual Assessment
masl	Metres above sea level
MANco	Management Committee
MAV	Maximum Allowed Values
m	Metre
m^2	Square Metre
MCDM	Multi-Criteria Decision Making
MFA	Armed Forces Movement
MINAMB	Angolan Ministry of Environment
MPI	Multidimensional Poverty Index
MPLA	People's Movement for the Liberation of Angola
MSA	Middle Stone Age
MVA	Mega Volt Amp
MW	Megawatt
MWh	Megawatt Hour
MWp	Megawatt Peak
NamPower	Namibia Power Corporation (Proprietary) Limited
MRV	Maximum Recommended Values
NAPA	National Adaptation Programme of Action
NOx	Nitrous Oxide
NTS	Non-Technical Summary
OCGTs	Open Cycle Gas Turbines
OECD	Organisation for Economic Co-operation and Development
OHS	Operational Health and Safety
OPEC	Organization of the Petroleum Exporting Countries
OPGW	Optical Ground Wire
OPHI	Oxford Poverty and Human Development Initiative
PAC	Project Affected Community
PAP	Project Affected Person

Abbreviation	Definition
PM	Particulate Matter
PNAAC	National Climate Change Adaptation Plan
PNE	National Emissions Plan
PPE	Personal Protective Equipment
PRODEL	“Empresa Pública de Produção de Electricidade”
PS	Performance Standard
PV	Photovoltaic
RAI	Regional Area of Influence
RAP	Resettlement Action Plan
RCP	Representative Concentration Pathways
REPTUR	General Regulation on the Territorial, Urbanistic and Rural Plans
RNT	Rede Nacional de Transporte de Electricidade
RPF	Resettlement Policy Framework
RTE	Round Trip Efficiencies
RTT	Resettlement Task Team
SADC	South African Development Community
SAPP CC	Southern African Power Pool Co-ordination Centre
SCC	Social Cost of Carbon
SDG	Sustainable Development Goal
SEP	Stakeholder Engagement Plan
SFDRR	Sendai Framework for Disaster Risk Reduction
SFP	Strategy to Fight Poverty
SMHI	Swedish Meteorological Hydrological Institute
SPI	Standardised Precipitation Index
STD	Sexually-Transmitted Disease
SR	Scoping Report
SWAPO	South-West Africa People’s Organization
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TB	Tuberculosis
ToR	Terms of Reference
TSS	Total Suspended Solids
TURH	Titles of Use of Water Resources
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNITA	National Union for the Total Independence of Angola
USD	United States Dollar
UXO	Unexploded Ordinance
VAC	Visual Absorption Capacity
VG	Vulnerable Group
VGP	Vulnerable Groups Plan
Vul	Vulnerable Species
W	Watts
WB	World Bank
WCDRR	World Conference on Disaster Risk Reduction
WHO	World Health Organisation
WWTP	Waste Water Treatment Plant

1 Introduction

The Southern African Power Pool Co-ordination Centre (SAPP CC) has appointed Aurecon South Africa (Pty) Ltd ("Aurecon") to conduct the Environmental and Social Impact Assessment (ESIA) process for the ANNA Transmission Interconnection Project.

The Environmental and Social Impact Assessment (ESIA)[1] documentation for the Angolan portion of the Angola-Namibia Transmission Interconnector Project (ANNA) is divided into three volumes: Volume I consists of the Non-Technical Summary (NTS), Volume II comprises the ESIA Report, and Volume III constitutes the Environmental and Social Management Plan (ESMP). Separate ESIA documentation has been compiled for the Namibian part of the line.

This Resettlement Policy Framework (RPF) forms part of the ESMP, as Annexure C, and provides an overview of the objectives, principles, policies, procedures and organisational arrangements for dealing with land access and resettlement for the implementation of the project in Angola.

The aim of the project is to alleviate the current electricity supply constraints and to contribute towards the security of energy supply by enhancing the distribution of electricity in the region. From its conception, the ANNA project has had the objective of promoting the highest positive economic, social and environmental impact possible whilst ensuring that all negative social and environmental impacts are addressed by avoiding negative impacts, or where they can't be avoided, minimising and compensating over and above the estimated impacts. This philosophy aims to ensure that the project attains a net positive social and environmental impact and contributes to the overall sustainable development of Angola and Namibia. These considerations were included in the initial conception of the project by means of selecting a route for the transmission line corridor that would avoid all identified sensitive environmental and social resources, as much as possible, as explained in Section 2.10 of the ESIA Report (Volume II).

The project is intended to link the Namibian and Angolan electricity networks in the north-western part of Namibia and in the southern part of Angola, initially supplying power to towns in the southern part of Angola, mainly Xangongo, Cahama and Ondjiva, as well as to provide for the future integration of 400 Kilovolt (kV) line(s) from the proposed Baynes Power Station[2]. Anticipated economic benefits include unlocking cheaper energy generation sources across the region, improved access to renewable energy sources (with lower emissions), reduced cost of transmission (due to an increase in transmission route options) and a reduced risk of supply interruptions to both countries. These objectives combined contribute towards the United Nations Development Programme (UNDP) Sustainable Development Goals (SDGs), as discussed in Section 3.3.4 of the ESIA Report (Volume II) and demonstrates progress towards the additional objective of climate co-benefits. The project design also included the applicable mitigation and adaptation measures, in order to minimise its vulnerability to climate change and increase its resilience.

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[1] Although referred to as an ESIA process internationally, the terminology used in the Angolan legislation is Environmental Impact Assessment (EIA) process and, in order to maintain consistency throughout this report, the term ESIA process will be used

[2] Planned on the Kunene River downstream of Ruacana.

1.1 Overview

The Southern African Power Pool (SAPP CC) co-ordinates the planning, generation and transmission of electricity on behalf of member state utilities in the Southern African Development Community (SADC) region. As such, SAPP has identified the Angola-Namibia (ANNA) Transmission Interconnector Project as one of the energy pool initiatives. The aim of the project is to alleviate the current electricity supply constraints and contribute towards security of energy supply in the long run by enhancing the distribution of electricity in the region. The project is intended to link the Namibian and Angolan electricity networks in the north-western part of Namibia and the southern part of Angola, initially supplying power to towns in the southern part of Angola, mainly Xangongo, Cahama and Ondjiva; but also to make provision for the future integration of the proposed Baynes Hydro-power Facility's 400 kV line(s). Anticipated economic benefits are to unlock alternative, cheaper energy generation sources across the region, improve access to cleaner energy sources (with lower emissions), reduce cost of transmission (due to an increase in transmission route options) and reduce the risk of supply interruptions to both countries. This contributes towards the United Nations Development Programme (UNDP) Sustainable Development Goals.

The project is funded by the European Union (EU) and the funds are administered by the Development Bank of Southern Africa (DBSA). An ESIA and associated RPF is required to meet the international lender standards for environmentally and socially sustainable development, and to meet national legal requirements. The SAPP CC appointed Aurecon South Africa (Pty) Ltd (hereafter referred to as Aurecon) as an independent consulting firm to provide transaction advisory services and to develop the ESIA documentation. The DBSA Environmental and Social Safeguard Standards (ESSS), closely linked to the Performance Standards (PS) of the International Finance Corporation (IFC) and the World Bank's Environmental and Social Standards (ESS), will guide the RPFs that will be undertaken separately for the Namibian and Angolan sections of the ANNA Project to meet the specific national legislative requirements.

SAPP CC appointed Aurecon as the independent consulting firm to provide transaction advisory services and project scoping for the transmission interconnector project between the two countries. As part of this role, Aurecon was commissioned to undertake the Preliminary Design and the ESIA, including an RPF, on the preferred transmission corridor. The design and environmental approval processes are for the construction of a 400 kV overhead transmission powerline, with a total length of approximately 362 km from the Kunene substation in Namibia (currently under construction) to the proposed Lubango substation in Angola. The greatest portion of the proposed transmission line (approximately 331 km) will be located within southern Angola (Figure 1.1) and approximately 32 km will be in Namibia. The ESIA applications will apply for approval of a 2 km-wide corridor for this length. The transmission line servitude of approximately 12 m wide, within which the transmission line will be constructed, will be located within this 2 km wide corridor. The servitude would impose restrictions on the use of the property within this corridor, and would need to be cleared of trees and obstacles that may interfere with the line, as well as a footprint of approximately 80 m x 40 m around each pylon. A single-track unpaved access route will be required to be established beneath the line.

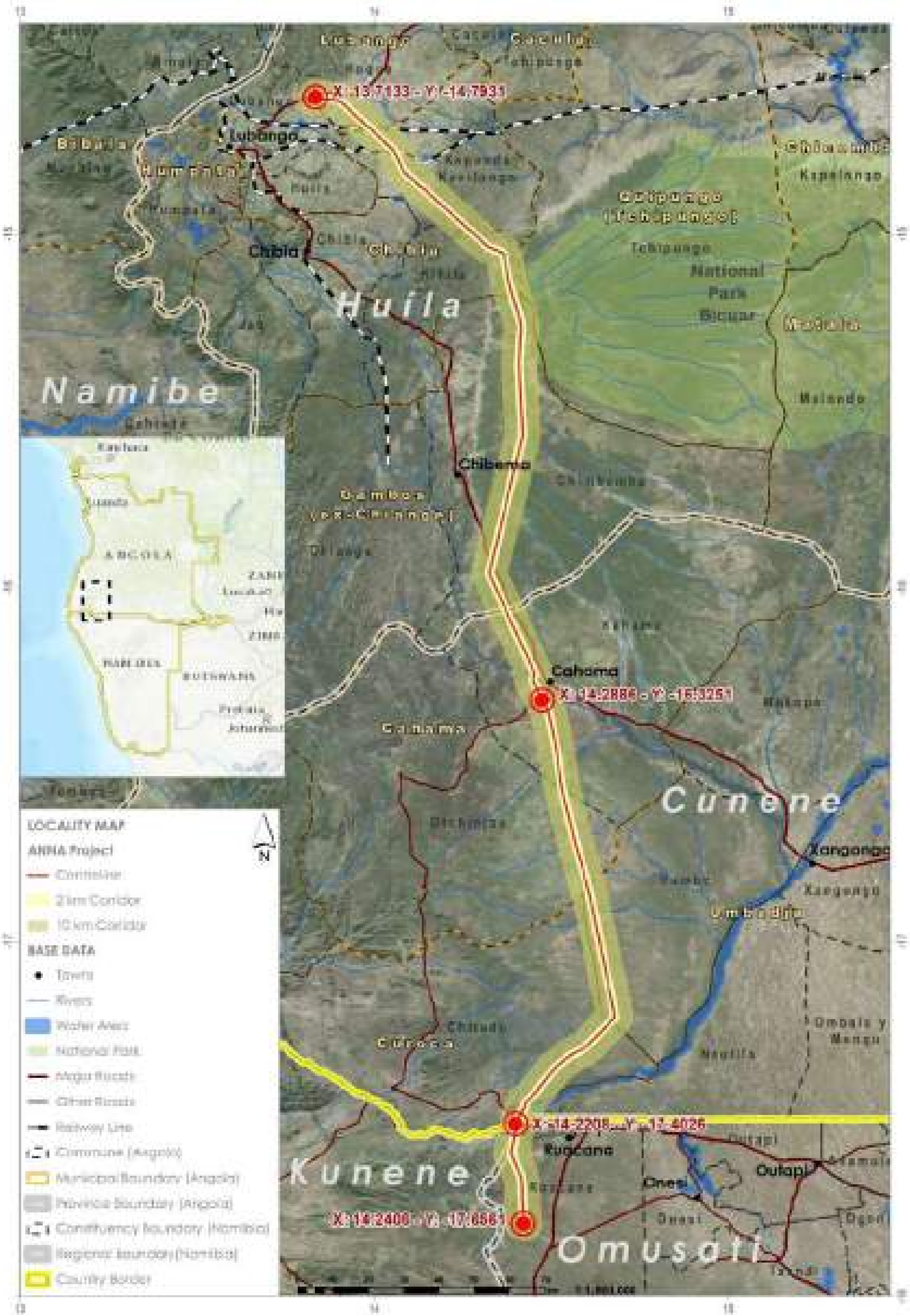


Figure 1.1: Locality map of the proposed ANNA Transmission line

1.2 RPF and RAP compilation, outcomes and deliverables

An RPF should broadly identify objectives, principles, policies, procedures and organisational arrangements for dealing with land access and resettlement. Such frameworks are particularly useful in two situations (Reddy, G. Smyth, E. Steyn, M., 2015):

- **Pre-feasibility study and feasibility study stages:** Particularly to assist in estimating the timeframe and the cost of land acquisition and resettlement.
- **Where there are multiple project components:** If a project has sub-projects or multiple components that cannot be identified before project approval, or that may be implemented sequentially over an extended period, an RPF can ensure consistency of approach between components and phases. Projects must then prepare management plans, such as Resettlement Action Plans (RAPs), that are consistent with the RPF, to cover each sub-project or component.

The resettlement action planning process can take between six and 18 months, depending on the number of project-affected persons (PAPs). Figure 1.2 below illustrates the steps in the process. Some of the steps can be completed simultaneously. The stakeholder engagement[1] process runs throughout the ESIA and RAP processes. It is presented in a linear manner, but the steps can overlap, be completed concurrently and, in some cases, move forward or backward.

1	•Announce the project
2	•Impact identification
3	•Legal framework
4	•Compensation framework
5	•Livelihood restoration
6	•Detailed budget
7	•Implementation schedule
8	•Organisational responsibilities
9	•Consultation and planning framework
10	•Grievance mechanism
11	•Monitoring, evaluation and reporting

Figure 1.2: RAP and stakeholder engagement

1.2.1 *Relationship between project phases, ESIA phases and the resettlement planning and implementation process*

Stakeholder engagement is integral to the ESIA process and is a legal requirement. Furthermore, to meet the DBSA and IFC requirements, intensive stakeholder engagement is a prerequisite.

The IFC Performance Standards (PS) apply to all project activities supported by the IFC. The requirements section of each PS applies to all activities financed under the project, unless otherwise noted in the specific limitations. Proponents are encouraged to apply the Environmental and Social Management System (ESMS), developed under PS 1, to all their project activities, regardless of financing source. A number of

[1] The Angolan Environmental Impact Assessment legislation refers to "stakeholder engagement" as a "public consultation process" which involves any I&AP (as defined above). In recognition of the international status of the project, due to the applicability of international financial institution environmental and social safeguards, the term "stakeholder engagement" has been used in this report, with the understanding that it is over and above the Angolan "public consultation process" and thereby complements the national process.

cross-cutting topics, such as climate change, gender, human rights, water and indigenous peoples, are addressed across multiple Performance Standards (IFC, 2012).

After ESIA disclosure, and once the SEP is approved, the stakeholder engagement during project implementation will occur at key stages, as shown in Figure 1.3. Figure 1.4 provides an overview of the relationship between stakeholder engagement, the project phases, from feasibility and project design, through construction, and into operation; and the resettlement planning and implementation process. Table 1.1provides the proposed engagement approach after the ESIA process has been completed, i.e. once the project commences with implementation.

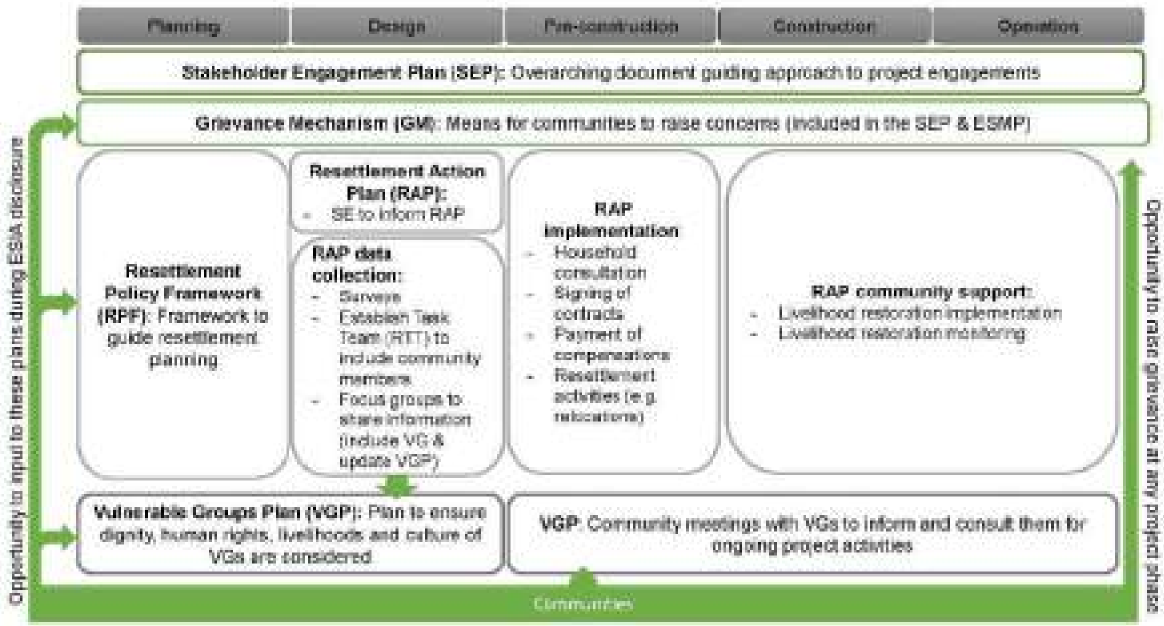


Figure 1.3: Stakeholder engagement components

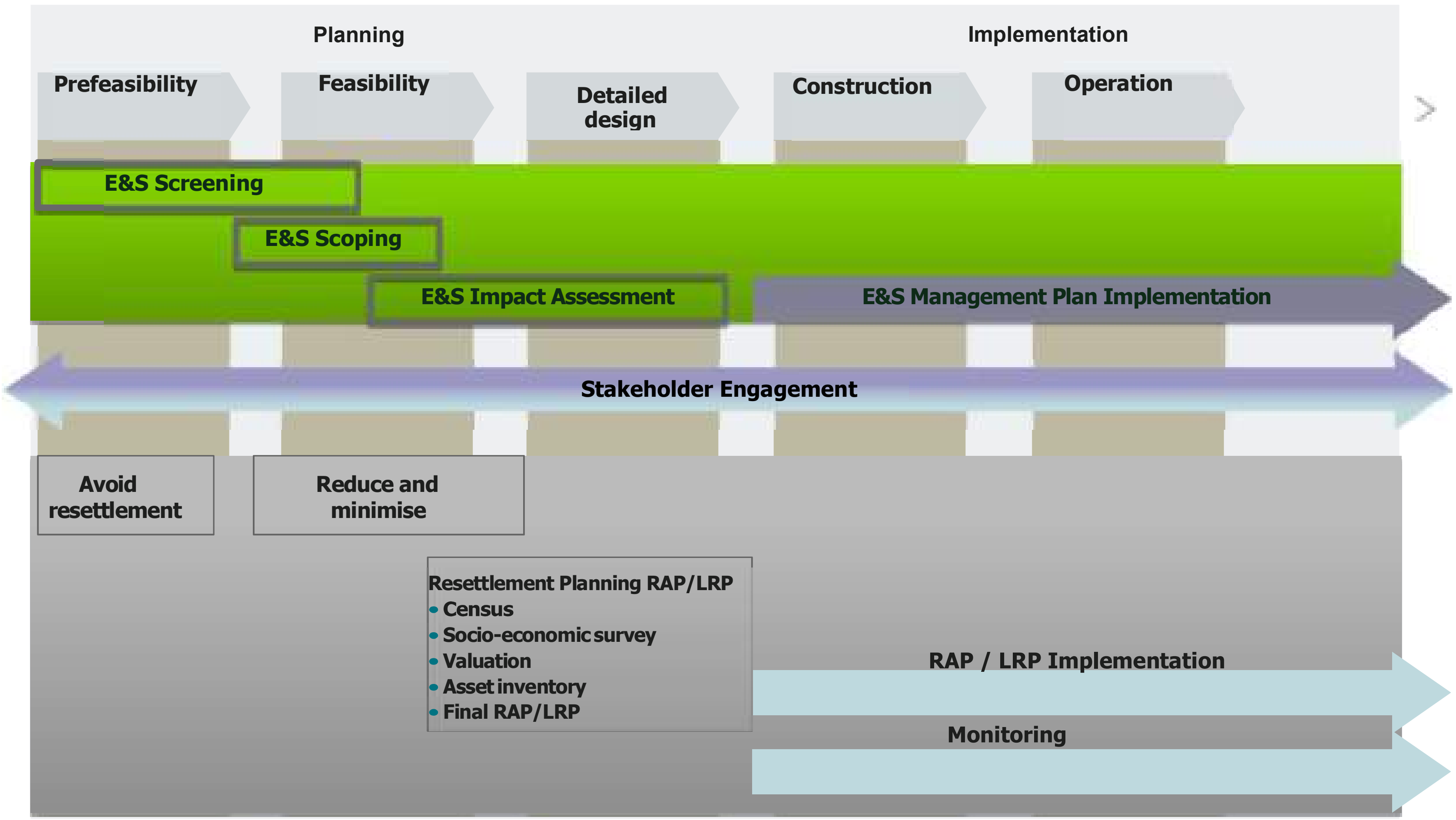


Figure 1.4: Resettlement process in relation to project stages and ESIA process

1.2.2 *Planned engagement during resettlement planning and implementation*

The following types of engagements are planned during the resettlement planning and implementation processes.

Table 1.1: Engagement planned during resettlement

Stage	Documents submitted	Type of engagement	Participation level	Objective	Participants
ESIA	ESIA Report, ESMP, SEP, VGP and RPF	Community meetings	Inform, listen and consult	• Project disclosure and impact assessment	PACs, PAPs
RAP screening	Socio-economic Baseline	Focus-group meetings, Community meetings, Key Informant Interviews	Inform, listen and consult	• Identify all people affected by the project and all adverse impacts on their livelihoods associated with the project's land acquisition. • Share information on process, schedule etc.	PACs, PAPs
RAP planning	Draft RAP including: Thematic Maps, Compensation Framework, Detailed Budget, Implementation Schedule, Legal framework for land acquisition and compensation, Description of resettlement assistance and restoration of livelihood activities, Grievance Redress Mechanism, Framework for monitoring, evaluation, and reporting	Census, Asset and Infrastructure Surveys, Community meetings and Key Informant Interviews	Inform, listen and consult	• Thematic maps that identify such features as population settlements, infrastructure, soil composition, natural vegetation areas, water resources, and land use patterns; • A census that enumerates the affected people and registers them according to location; • An inventory of lost and affected assets at the household, enterprise, and community level; • Socio-economic surveys and studies of all affected people (including seasonal, migrant, and host populations), as necessary; • Analysis of surveys and studies to establish compensation parameters, to design appropriate income restoration and sustainable development initiatives, and to identify baseline monitoring indicators; and • Consultation with affected populations regarding mitigation of effects and development opportunities. • The RAP compensation framework specifies all forms of asset ownership or usage rights among the population affected by the project and the project's strategy for compensating them for the partial or complete loss of those assets. The compensation framework should include a description of the following: **1** Any compensation guidelines established by the host government; **2** In the absence of established guidelines, the methodology that the project sponsor will use to valuate losses; **3** The proposed types and levels of compensation to be paid; **4** Compensation and assistance eligibility criteria; and **5** How and when compensation will be paid.	PACs, PAPs

Stage	Documents submitted	Type of engagement	Participation level	Objective	Participants
				• The legal framework of a RAP describes all laws, decrees, policies and regulations relevant to the resettlement activities associated with a project. • Where displacement is unavoidable, the sponsor should plan and execute resettlement as a development initiative that provides displaced persons with opportunities to participate in planning and implementing resettlement activities, as well as to restore and improve their livelihoods. • It is essential that all costs be estimated carefully and included in a detailed RAP budget. Without an accurate assessment of the costs of land acquisition, compensation for lost assets and physical displacement, project planners cannot determine the real cost of project design alternatives such as alternative routes for power transmission lines or alternative sites for greenfield projects. The sponsor should itemise resettlement costs by categories of impact, entitlement, and other resettlement expenditures including training, project management, and monitoring. The results should be presented in a tabular form that illustrates expenditures over the life of the project. To ensure that all adverse impacts have been taken into account, budget line items should be checked against categories of adverse impact and entitlements. The RAP budget must include a justification of all assumptions made in calculating compensation rates and other cost estimates and must take into account both physical and cost contingencies. • The RAP budget should be linked with a detailed implementation schedule for all key resettlement and rehabilitation activities. This schedule should, in turn, be synchronised with the project's schedule of civil works construction. Timing of the RAP field activities (consultation, census and survey implementation) is crucial: commencement of field activities too soon before the project begins may raise local expectations and attract newcomers; commencement of activities too late after the project starts may interfere with project implementation. Planners should be attentive to the agricultural and employment cycles of affected people and avoid scheduling key resettlement activities at times that may disrupt these cycles. Linking resettlement and construction schedules ensures that project managers place key resettlement activities on the same critical path as key project construction activities. Linking schedules in this way creates an imperative for co-ordinating resettlement with other project activities throughout the chain of project management.	

Stage	Documents submitted	Type of engagement	Participation level	Objective	Participants
				• The RAP must identify and provide details on the roles and responsibilities of all organisations, public or private, governmental or non-governmental, that will be responsible for resettlement activities. • Regardless of its scale, involuntary resettlement inevitably gives rise to grievances among the affected population over issues ranging from rates of compensation and eligibility criteria, to the location of resettlement sites and the quality of services at those sites. Timely redress of such grievances is vital for the satisfactory implementation of resettlement and for the completion of the project on schedule. • The RAP must provide a coherent monitoring plan that identifies the organisational responsibilities, the methodology, and the schedule for monitoring and reporting. The three components of a monitoring plan should be performance monitoring, impact monitoring, and completion audit. The scope of the monitoring plan should be commensurate with the scale and complexity of the RAP.	
RAP disclosure	Public Consultation and Participation Framework, Public consultation log	Focus group meetings, Community meetings, Key Informant Interviews	Inform, listen and consult	• Effective resettlement planning requires regular consultation with a wide range of project stakeholders. Early consultation helps to manage public expectations concerning the impact of a project and its expected benefits. Subsequent consultations provide opportunities for the sponsor and representatives of people affected by the project, to negotiate compensation packages and eligibility requirements, resettlement assistance, and the timing of resettlement activities. Project consultation with people affected by resettlement is mandatory. • Promoting participation - The sponsor must initiate and facilitate a series of consultations with project stakeholders throughout the planning and implementation of a RAP. The purpose of these consultations is to inform stakeholders about the project and its effects and to provide opportunities for people to voice their concerns and propose alternatives. • Formal consultations convened by the sponsor should include sponsor representatives, project managers, relevant government authorities, representatives of concerned NGOs, and members of both displaced and host communities. Discussions should centre on the effects of the project and measures to mitigate those effects. Because of discrimination within their societies, women and members of other vulnerable groups may find it difficult to defend their interests in a public forum. For this reason, it is important for project management, or the agencies responsible for RAP planning and implementation, to employ women and members of other	PACs, PAPs

Stage	Documents submitted	Type of engagement	Participation level	Objective	Participants
				vulnerable groups. These staff members can undertake outreach efforts, such as focus-group consultation, to learn the concerns of vulnerable groups and convey them to resettlement planners and project managers. • The objective of these consultations should be to secure the participation of all people affected by the project in their own resettlement planning and implementation, particularly in the following areas: o Alternative project design; o Assessment of project impacts; o Resettlement strategy; o Compensation rates and eligibility for entitlements; o Choice of resettlement site and timing of relocation; o Development opportunities and initiatives; o Development of procedures for redressing grievances and resolving disputes; and o Mechanisms for monitoring and evaluation and for implementing corrective actions. • Regular consultation with affected people allows project management to monitor the adequacy and effectiveness of the RAP's compensation packages, livelihood restoration efforts and development initiatives. • Depending on the size and scope of the project, the sponsor may employ a community liaison representative with a budget specifically for the facilitation and management of public consultation. Alternatively, the sponsor may contract a reputable and experienced NGO to provide the same services. However it chooses to manage information disclosure and public consultation, the sponsor must ensure that affected people have access to information about the project, and opportunities to seek redress of grievances relating to the project. • Project management must document its information disclosure and public consultation efforts. This documentation should identify who was consulted, what was discussed, and what follow-up was required.	
RAP implementation	Signed Individual household dossiers, Tender documentation, Construction Management Plan and Livelihood	Community meetings, Household meetings	Negotiate, discuss and agree	• Tendering and contracting of works; • Individual household sign-off; • Resettlement construction; • Participatory monitoring and oversight of the sign-off, construction and moves processes; • Moving of resettling households; • Final approvals and handover to statutory authorities;	PACs, PAPs

Stage	Documents submitted	Type of engagement	Participation level	Objective	Participants
	Restoration Progress Report			• Demolition of existing settlements; • Follow up with resettlement communities and households; • Livelihood restoration and community development implementation key considerations (Reddy, et al., 2015): o Replace project-affected households' existing livelihood activities as a first priority to provide a baseline safety net to all households to ensure a minimum standard of living. o Land-for-land replacement is the most effective livelihood restoration intervention, but this can be particularly challenging where the project is acquiring large tracts of land in areas with high population densities. o Agricultural support must be provided along with replacement land in order to get impacted households quickly self-sufficient in food again. o Skills training must begin as early as possible in the project cycle to prepare as many locals as possible for direct and indirect employment on the project. o Local employment is the highest-priority benefit for local communities and the project should put in place a fair and effective local employment policy and plan. o Local procurement from local businesses builds support for the project.	
After RAP completion (construction and/or operation)	GM report, Monitoring and Evaluation report	Regular community meetings, Grievance mechanism	Feedback from community and reporting of grievances	• Ongoing support; • Publicise/broadcast the importance of the project in the long term, how people can benefit from electricity and how and when the grid will be expanded to their communities (if applicable); • Grievances are best redressed through project management, local civil administration, or other channels of mediation acceptable to all parties. Such channels of mediation may involve customary and traditional institutions of dispute resolution. The project management should make every effort to resolve grievances at the community level. Recourse to the legal system should be avoided except as a last resort.	PACs, PAPs

1.3 Principles and objectives

The methodology adopted in preparing this RPF was consistent with the requirements of the IFC, the DBSA and relevant Angolan Legislation. This RPF defines the procedures for involuntary land acquisition, resettlement, and sets out objectives, principles, compensation entitlements, legal frameworks, consultation procedures and grievance redress mechanisms for the successful realisation of this project.

The project is in the feasibility stage and an RPF has therefore been developed that will inform the RAP, to be developed when the detailed design has been completed. The proposed ANNA project will involve the establishment of a permanent 12 m wide servitude along the length of the transmission line. Certain land use restrictions will be permanently in force within this servitude. In addition, construction activities will necessitate a temporary disruption of all current land uses in a corridor to either side of the permanent servitude. This area will be termed the "temporary servitude".

Households and communities residing or owning assets within the servitude, or in the areas earmarked for surface infrastructure, will therefore experience physical and/or economic displacement as a result of the project. In addition, construction activities may cause a temporary disruption in access and communities' daily movement patterns from one side of the transmission route to the other.

To address such impacts, it was necessary to compile an RPF that conforms to the requirements of the DBSA Environmental and Social Safeguard Standards (ESSS) 5 - Land Acquisition, Restrictions on Land Use and Involuntary Resettlement, IFC Performance Standard (PS) 5 - Land Acquisition and Involuntary Resettlement, as well as IFC Good Practice Handbook. The guiding principle in the preparation of a RAP is to ensure that:

- All PAPs and Project Affected Communities (PACs) affected by future land acquisition and potential resettlement issues, are properly consulted;
- Affordable and accessible grievance mechanisms are made available to PAPs and PACs;
- All PAPs and PACs are compensated for their losses in assets, at replacement cost or market value (whichever is higher); and
- All PAPs and PACs are provided with rehabilitation measures so that they are at least as well off as they would have been in the absence of the project.

The main objectives of the RPF are to:

- Provide details on the policies governing land expropriation, the range of adverse impacts and entitlements;
- Present a strategy for achieving the objectives of the resettlement/land acquisition policy;
- Provide a framework for implementation of the stated strategies to ensure timely acquisition of assets, payment of compensation and delivery of other benefits to PAPs;
- Provide details on public information, consultation and participation, and grievance redress mechanisms in project planning, design and implementation;
- Provide identified sources and estimates of required resources for implementation of the RAP; and
- Provide a framework for supervision, monitoring and evaluation of resettlement implementation.

2 Socio-economic environment

2.1 Population and administration

The results of the latest census conducted by the relevant institutions of Angola point out that, for each square kilometre (km^2), there were about 14 people, which reflects a low population density, although quite variable, with this indicator varying between 232.9 and 0.7 inhabitants/km^2. The populations of the provinces and affected municipalities are shown in Table 2.1, along with the affected communes.

Table 2.1: Angolan municipalities affected by the proposed ANNA project

Province	Municipality	Commune
Huíla		
The province of **Huíla**, inhabited by approximately 2 497 422 people, was originally populated by the Khoisan, of which few groups remain. Ethnic groups that migrated into the region include Nyaneka, Nkhwnbi, Umbundo, Nganguela, and Tchokwe Herera. Agro-pastoralist ethnic groups such as the heterogenous Nyaneka-Humbe, Mwila and Kuvale are most common (Angola Consulate TX, 2015). The province's population was estimated at 2.4 million in 2014. The languages most commonly spoken include variants of Nganguela (Welcome to Angola, 2019).	**Lubango** *Population:* 776 249 (2014); 876 339 (2018 projection)	**Hoque**
	Chibia	**Kapunda** **Kavilongo**
	Population: 190 670 (2014); 215 219 (2018 projection)	**Kihita**
	Gambos (ex-Chiange) *Population:* 79 462 (2014); 89 684 (2018 projection)	**Chimbemba**
Cunene		
The **Cunene** Province is inhabited by approximately 990 087 people (City Population, 2019). The majority of the population consist of Ovambo agro-pastoralists, and few subsistence farmers. The Kwanyama people (an Ovambo group) are most abundant, whereas the Hinga (a Nyaneka-Nkhumbi-group), Chókwè, Muhimba (Herero) and Khoisan groups also occur in the province (Angola Consulate TX, 2015).	**Cahama**	**Kahama**
	Population: 70 061 (2014); 79 379 (2018 projection)	**Otchinjau**
	Curoca *Population:* 41087 (2014); 46 556 (2018 projection)	**Chitado**
	Ombadja	**Humbe**
	Population: 304 964 (2014); 345 490 (2018)	**Naulila**

Despite the low population density recorded, there is enormous population diversity, and several ethnic groups can be distinguished. Among them are: the "Bantu" language groups, which are more representative; the "Humbe", the "Ovambos" and the "Hereros", whose main activity is agriculture, mostly cattle farming; and, less representative, the "Non-Bantu" language groups, such as the "Khoisan" – small dispersed groups that are mainly engaged in hunting. The distribution of ethnic groups across the country is shown in Figure 2.1, which indicates that the dominant ethnic groups in the study area are Herero (or Ovaherero) and Hanica-Humbe (or Nyaneka-Nkhumbi).

Settlements

A significant part of the study area shows large expanses of sparsely-inhabited territory, displaying the traditional characteristics of a rural settlement, with clearly-visible inhospitable areas formed by the absence of rivers, especially in the north-west and south-west sectors. There are two distinct types of rural settlements: (i) concentrated, where the communities distribute themselves along the banks of the main watercourses in fertile lands, mostly practicing agriculture; and (ii) sparse, where communities (semi-nomadic) settle (permanently or temporarily) near dry or temporary rivers. This type of settlement is heavily influenced by the characteristics of the ecosystem (climatic and edaphic), and by its connection to cattle management. Communities are thus arranged in small villages or "ongandas" that are characterised by their circular shape and enclosed by a fence of thorny branches and other shrub trees. Of note is also the presence of temporary camps or "sambos" that accompany the herds during transhumance in search of water and pasturelands. These camps can move three to four times a year. Thorny branches or other shrub trees also limit these smaller camps, when compared to ongandas.

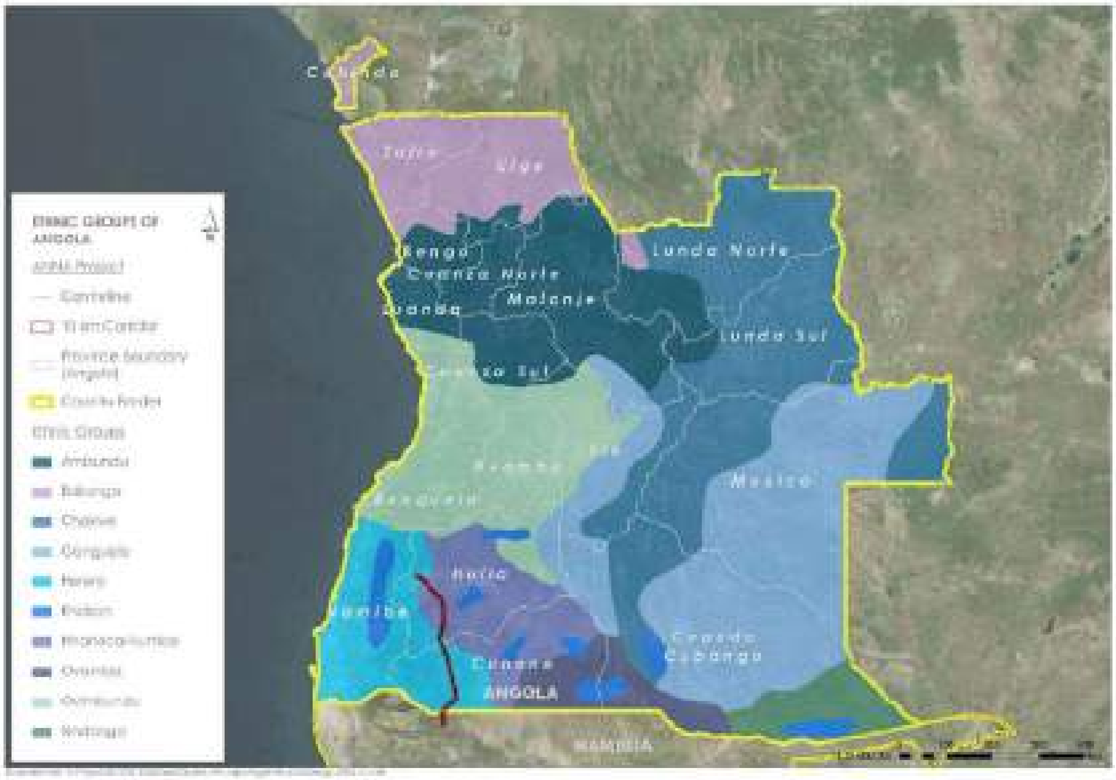


Figure 2.1: Areas of tribal origin in Angola, showing that the project area is dominated by Herero and Haneco-Humbe ethnic groups

The main urban area of the study area is Lubango (capital of the Province of Huíla). The remaining cities (secondary cities), have a much lower population. The density of urban settlements decreases as one moves to Namibia, with the Angolan segment comprising more than 90% of the urban population of the study area.

This form of human occupation has repercussions on the current use of the study area, which is predominantly marked by large extensions of grassland areas, interspersed by small cropland areas.

Land mines

The corridor runs through several areas that may potentially contain landmines and that will require demining prior to any site visit or survey. The majority of the identified areas are in the southern areas, between Cahama and the Namibian border. However, due to Angola's recent history of war, other areas in the territory may exist that have are as yet unidentified.

2.2 Land Tenure

Angolan land is managed and owned by the State. The Land Law (*Lei de Terras de Angola, Lei nº 9/04, de 9 de Novembro*) aims to normalise land tenure in Angola after its civil war. Article 34 of this law states that the State can grant, *inter alia*, (a) private property rights to <u>urban land</u> and (b) useful customary domain to <u>rural communities</u> (Urban LandMark, 2013). Land is mostly held under principles of *customary* law, with very few citizens having rights under *formal* law (US-AID, 2010). The Angolan government has little capacity to initiate formalisation procedures, but land occupants are encouraged to apply for formalisation. Furthermore, with independence, the departure of many colonial civil servants meant that the formal colonial land cadastre ceased to be managed and updated, which limits access to land, inhibits the transfer of land and forces people into making informal arrangements.

The Land Law stipulates that concessions of up to 1 000 m² of urban land may be authorised by the Municipal Administration, the Provincial Governor needs to authorise concessions of land areas of up to 50 000 m², and concessions of areas larger than 50 000 m² may only be authorised by the Minister of Urbanism and Construction (Urban LandMark, 2013).

2.3 Development challenges

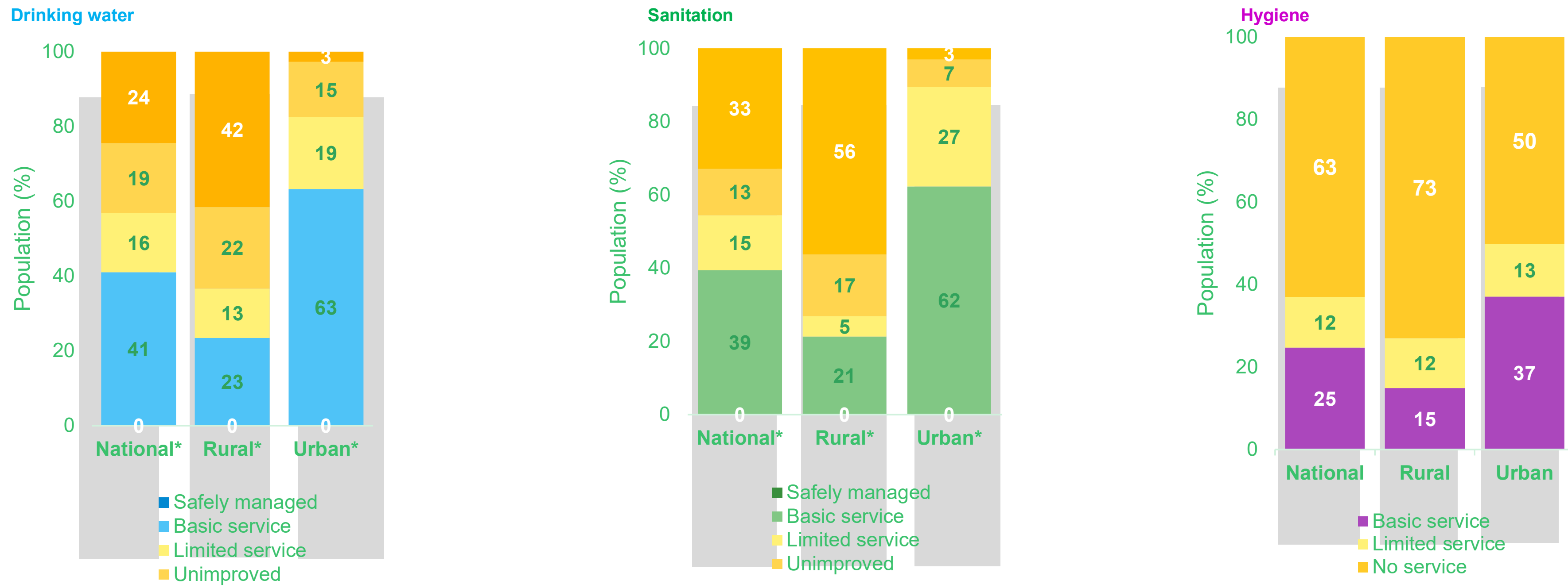
In 2002, peace accords were eventually signed in the country, after 40 years of virtually continuous war. Since then, the country's economy has grown rapidly, but inequities persist, and nearly 40% of Angolans live in poverty, and maternal mortality and teenage pregnancy remain high. Specialists suggest that the economy is hindered by an entrenched patronage system, a shortage of skilled workers and the warping effects of an economy dominated by oil. Roads, railways and bridges were destroyed during the war, and agricultural infrastructure was destroyed. Angola lacks a pool of skilled labour (nearly half the population is under 15 years old); a functioning health-care system (its infant mortality rate is among the highest in the world); and enough schools for its children (45% of school-age children are not reached by the education system) (CFR, 2008). Furthermore, the unemployment rate was estimated at 20% in 2018, and was high among young people in urban areas, at 38%, as recently as 2018 (Afrian Development Bank Group, 2019).

Post-war Angola provided a considerable increase in tax incomes, via oil taxes, with an increase of more than 53%. However, oil-based GDP-growth is prone to international markets, and the 2008 global financial crisis made the diversification of markets difficult. Furthermore, the wealth earned from the oil-sector is mostly attributed to a few persons in power. If the Gini-coefficient for the country were lower, income per capita would have been a mere $12.80 per day. This shows that "trickle-down" effects of wealth generated from the oil industry during 2002 and 2008, are rare (Da Rocha, 2012).

2.4 Water and sanitation

UNICEF data on water supply, sanitation and hygiene (handwashing facilities) in Angola is shown in Figure 2.2. Data aggregated into rural and urban sections show that the urban population are, in all cases, better off than the rural population. Urban areas have better access to basic drinking water and sanitation services, use fewer unimproved (such as an uncovered spring, unprotected from contamination) water and sanitation sources, use fewer surface water services (which are usually of poorer quality than groundwater sources), practice less open defecation, and have better access to handwashing services. In 2012, Angola was ranked as number 12 on the list of the top 25 African countries with the least-sustainable access to improved/clean water (African Public Health Info, 2012). Boreholes with hand pumps are primarily employed to serve the needs of the rural population in Angola, while solar-powered systems are becoming a more popular option, both among communities and government. In Huíla, the so-called Community-Led Total Sanitation (SLTC) programme for rural sanitation is the best developed of all the Angolan provinces in which it has been rolled out, as it was the launch point for a UNICEF-led Open-Defecation Free (ODF) programme complemented by the School-Led Total Sanitation (STLE) approach (Cowater International, 2015)

Water, sanitation and hygiene ladders for Angola



*No safely managed estimate available

*No safely managed estimate available

Angola	Drinking water			Sanitation			Hygiene		
	National* 2015	Rural* 2015	Urban* 2015	National* 2015	Rural* 2015	Urban* 2015	National 2015	Rural 2015	Urban 2015
Safely managed	-	-	-	-	-	-	-	-	-
Basic service	41	23	63	39	21	62	25	15	37
Limited service	16	13	19	15	5	27	12	12	13
Unimproved	19	22	15	13	17	7	-	-	-
No service	24	42	3	33	56	3	63	73	50

Source: WHO/UNICEF JMP (2017a)

Figure 2.2: Water, sanitation and hygiene data for Angola

2.5 Education

Enrolment levels in Angolan schools decrease dramatically from the pre-primary and primary, to the tertiary education level, as shown in Table 2.2, but has, encouragingly, increased between 2008 and 2011.

Table 2.2 also shows the net enrolment rates at different education levels between 2008 and 2016 in Angola, and indicates that primary enrolment levels are generally higher than secondary enrolment levels (UIS/UNESCO, 2016). Furthermore, female enrolment is lower than that of males throughout, as shown in Figure 2.3. This figure also shows that gross enrolment levels are lower at secondary level than at primary level (UIS/UNESCO, 2016).

Table 2.2: Net enrolment rates at varying education levels between 2008 and 2016 in Angola (UIS/UNESCO, 2016)

Education level	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pre-primary	61.7	57.64	53.51	54.31					64.49
Primary	74.89	74.15	75.28	77.45					
Secondary	9.24	9.72	11.39	9.24					
Tertiary*				6.25		8.98		8.5	
**Gross enrolment levels are provided, as net enrolment rate data was not available.*									

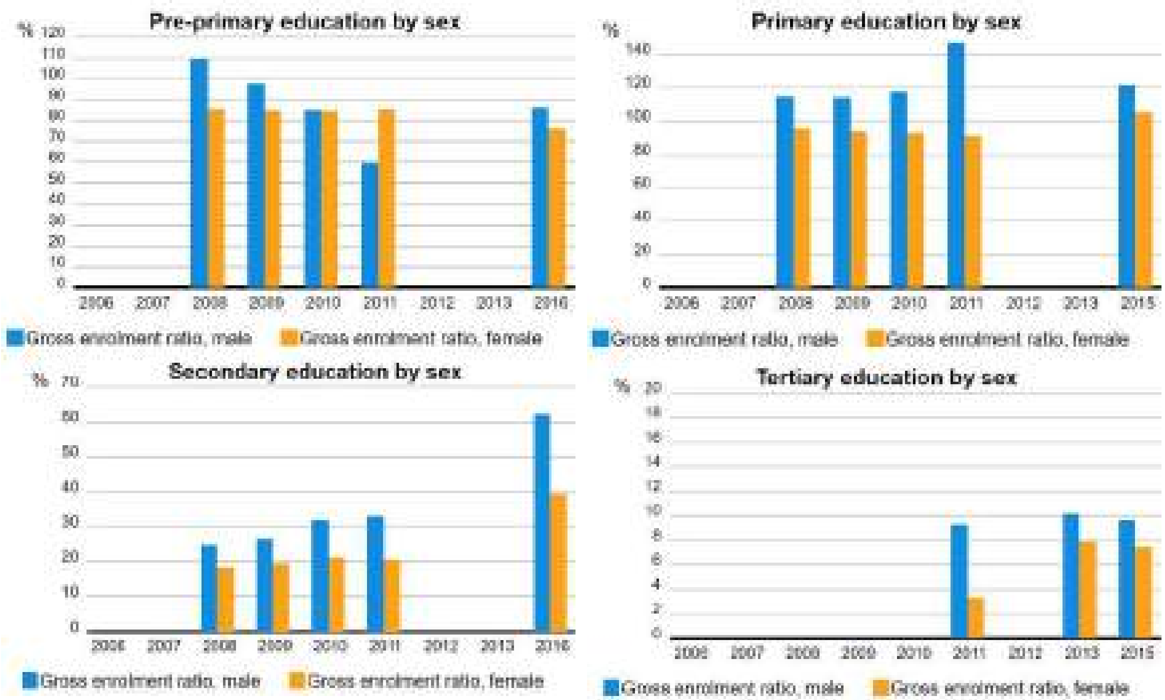


Figure 2.3: Levels of gender participation in education in Angola (UIS/UNESCO, 2016)

2.6 Health

The following information was taken from the World Health Organization's Country Co-operation Strategy for Angola, its data originating from various sources, including the Angolan Census of 2014. The Angolan health system is managed by the Primary Health Care and Hospital Assistance Programme, comprising of five sub-programmes:

1. Promotion of healthy habits and lifestyles;
2. Operationalisation of healthcare services;
3. Safe blood transfusion;
4. Management and development of the national laboratory network; and
5. Pre-hospital assistance.

The National Health System (NHS) includes the National Health Service, which operates under the supervision and methodological guidance of the Ministry of Health, and managed by provincial governors and municipal administrators. The following five sub-systems and supplementary services are part of the NHS:

1. The Health Service of the Angolan Armed Forces (DSS/EMG/FAA), which is the biggest national partner of the Ministry of Health with respect to assistance to community services of major public companies (SONANGOL, ENDIAMA and others).
2. The National Civil Protection Service (SNPC) of the Ministry of Interior, which takes the lead in organising a response to natural disasters and emergencies. It is also responsible for health surveillance interventions organised by the National Police Force in areas relating to supervision, economic activities and border control.
3. Generating revenue in hard-to-reach areas, providing logistical support for large-scale campaign activities and responding to health emergency situations.
4. The health education sub-system, i.e. technical and professional institutions, and public and private medical schools.
5. Health and non-profit private healthcare services (essentially run by religious institutions and NGOs). However, in recent years the presence of international NGOs has been declining.

The most pressing challenges currently experienced in the Angolan health sector relate mainly to:

1. Insufficient coverage and poor maintenance of healthcare centres;
2. Poor referral and counter-referral systems between the different levels of the National Health System (NHS);
3. Limited human resources and healthcare professionals, in terms of expertise and numbers, and poor distribution of personnel in rural and peri-urban areas;
4. Weaknesses in the health management system, including the information, logistics and communications systems;
5. Scarcity of financial resources and a poor financing model; and
6. Limited access to safe drinking water, sanitation and energy.

One of the ongoing governmental strategies to address the poor distribution and presence of healthcare facilities and promotion of healthy living, is the implementation of Community Development Agents (ADECOS) to support health promotion and the promotion of other sectors' community programmes.

Angola is vulnerable to outbreaks of diseases such as yellow fever, malaria, cholera, and Zika, which overload the healthcare services. Communicable diseases account for more than 50% of deaths recorded within the population:

- Malaria is the leading cause of death, disease and absenteeism. It accounts for approximately 35% of curative care, 20% of hospital admissions, 40% of perinatal deaths and 25% of maternal mortality.

- Tuberculosis (TB) diagnosis and treatment is often delayed due to a shortage in medication. The reported annual incidence of pulmonary TB was 182.7 per 100 000; 204.1 per 100 000 TB prevalence (all forms); 367 new cases of multidrug-resistant tuberculosis (MDRTB) and 3 613 TB/HIV cases in 2017.
- HIV/AIDS affects 2.1% of the Angolan population, but the data varies within the country. For instance, an above average 6.6% of the Cunene population has HIV/AIDS.

As for non-communicable diseases (NCD), advances have reportedly been made in the legal framework restricting and taxing tobacco use. Despite the progress achieved in post-war Angola in neonatal, child, and maternal mortality, some challenges remain.

Additional information on the status of healthcare in the country is provided in Table 2.3.

Table 2.3: Statistics on the health of Angolan children, mortality and the Angolan health system (WHO, 2017a)

Child health	
Infants exclusively breastfed for the first six months of life (%) (IIMS 2015-2016) (DHS 2015-2016)	38%
Diphtheria tetanus toxoid and pertussis (DTP3) immunisation coverage among 1-year-olds (%) (2016)	31%
Demographic and socio-economic statistics	
Life expectancy at birth (years) (Censo 2014)	51.2 (Male) 54.2 (Female)
Health system	
Total expenditure on health as a percentage of gross domestic product (2014)	3.31%
Private expenditure on health as a percentage of total expenditure on health (2014)	35.74%
Total expenditure on health per capita (2014)	239
Density of physicians (per 1 000 population) (2009)	0.17
Density of nursing and midwifery personnel (per 1 000 population) (2009)	1.66
Mortality and global health estimates	
Neonatal mortality rate (per 1 000 live births) (2016)	24
Under-five mortality rate (probability of dying by age 5 per 1 000 live births) (2016)	68
Maternal mortality ratio (per 100 000 live births) (2015)	239
Births attended by skilled health personnel (%) (IIMS 2015-2016) (DHS 2015-2016)	49.6

2.7 Livelihood strategies and economy

Agriculture and livestock are the dominant activities in the study area, which provide communities with their main source of food supply and, in the case of surpluses, also their source of income. These are activities of tremendous socio-economic importance, practiced by most rural families.

Agriculture is essentially practiced manually, i.e. without the use of machinery, on small family farms under rainfed conditions, with the aim of household consumption. It is an activity defined by its absolute dependency on edaphoclimatic conditions (predominantly sparse and irregular rains, low soil moisture storage capacity and insufficient water storage infrastructure), and its incapacity to obtain higher yields. The production system consists mainly of maize, *massango* and *massambla* tubers, and other essential crops. The cultivated areas are more common along the rivers and main watercourses, and in the flood plains (called “chanas” in Angola).

Although rainfed agriculture is predominant in the study area, irrigation is being promoted by government agencies. Close to the corridor, irrigation occurs mostly within the irrigation perimeter of Chíbia.

As the study area is gaining semi-arid characteristics, the importance of rainfed agriculture starts to decrease, becoming an almost marginal activity (when climatic conditions allow it), being replaced by pastoralism. In this region, pastoralism represents the main activity, if not wholly exclusive, from which households obtain most of their food supply and their income, enabling them to subsist in such a hostile environment. Extremely dependent on pasture, which in turn is limited in the less-favourable edaphoclimatic conditions, the grazing system (transhumant grazing) is based on the seasonal migration of people with their animals (especially cattle) over long distances, in search of better areas of grazing and water resources, remaining there for as long as the pasture and water is available. The kind of pastoralism practiced can be considered as “free grazing”, where the animals move freely to search for pasture and water, or as “grazing of passage”, i.e. in constant movement.

People who engage in transhumant pastoralism are known as semi-nomadic pastoralists. An example of this is the Himba population (of the Herero group) who have long practiced this type of pastoralism.

Even though it is not very representative in the study area, the prevailing industry is mostly dedicated to the exploration of inert materials, encouraged by the existing mining potential of the region due to its deposits of metallic or non-metallic ores. On the Angolan side, literature consulted refers to the presence of active ornamental rock mining: four in the Municipality of Cahama, six in Ombadja and one in Gambos, although their geographic location is unknown.

2.8 Gender and vulnerability

According to the Social Institutions and Gender Index 2014 Edition, Angola has medium levels of discrimination against women in social institutions. It presents a lower discrimination in bias towards sons (as opposed to daughters), but higher discrimination with regards to restriction of access to resources and assets. The following information was provided by the World Bank (World Bank, 2018a):

- In 2012, 59% of women aged 15+ were literate, compared to 82% of men.
- In 2013, 65% of the female working-age population was part of the labour force, while 78% of the male working-age population was.
- In 2013, women represented 47% of the total labour force.
- The prevalence of the use of contraception among females increased to 13.7% in 2016, from 6.2% in 2001.
- The participation of males in the labour force has reduced since 1990, and has increased for females, as shown in Figure 2.4 and Figure 2.5. However, the male contingent is still higher than that of females, at 80% and 75% respectively.

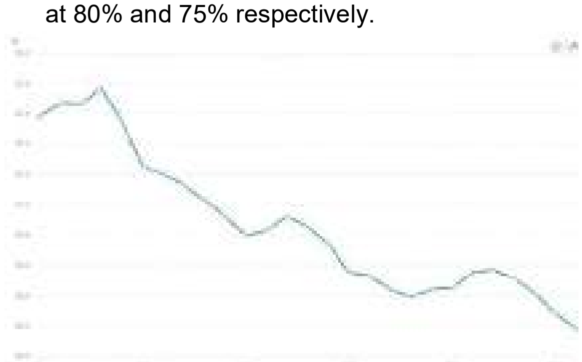


Figure 2.4: Percentage of males over age 15 participating in the Angolan labour force (World Bank, 2018a)

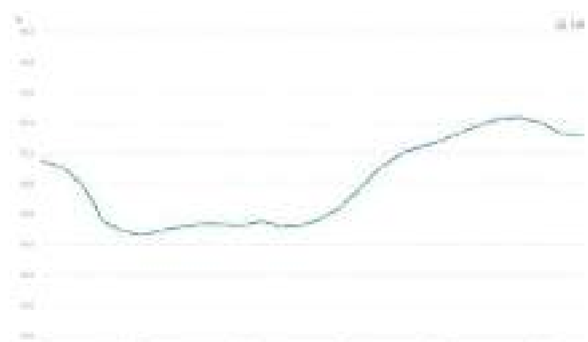


Figure 2.5: Percentage of females over age 15 participating in the Angolan labour force (World Bank, 2018a)

- In 2017, the prevalence of HIV/AIDS in males was slightly lower than in females, at 0.3% and 0.9% respectively.
- On a more encouraging note, the proportion of seats held by women in national parliament stood at 38.2% in 2017, up from 15 in 2007. Furthermore, the unemployment rate of females decreased from

18% in 2007, to 9% in 2017. The statistic is equally encouraging for males (15% in 2007, down to 8% in 2017). However, of the females employed, 81% are regarded as vulnerable, compared to 53% of males (a high proportion for both sexes). Only 16% of employed females receive wages or salaries, compared to 41% of males.

2.9 Indigenous peoples

The San (and related groups such as the Kwisi and Kwepe), the Himba and their related groups (such as the Kuvale and Zemba), constitute the indigenous peoples of Angola. They total approximately 25 000 people, or 0.1% of the Angolan population. Most of the indigenous groups reside in the Huíla, Cunene, Kuando and Kubango provinces, as well as some in the Moxico Province in south-western Angola. The exact numbers and location of all San communities is, however, unknown. The language spoken by the Himba is primarily Herero.

The indigenous San peoples of southern Angola are the oldest inhabitants of Angola and southern Africa and are mainly located in remote and inaccessible areas. Many still live as hunter-gatherers (primarily in Kuando and Kubango provinces), residing in rudimentary shelters and moving within their ancestral territories, while others have settled in homesteads where they practice agriculture, surrounded by Bantu neighbours, or live in urban communities.

The San are regarded as a vulnerable ethnic minority, as they live in extreme poverty, often in areas that are not yet cleared of landmines. The illiteracy rate among the Angolan San is very high and, due to the lack of infrastructure in Angola, the lack of birth certificates, as well as discrimination, few San children attend schools. The mortality rate of the San is very high, as San families often cannot afford medication and treatment. It is reported that the San people have an inferior social standing in relation to the other ethnic groups of Angola (IWGIA, 2011).

The Angolan drought and economic downturn have further exacerbated the plight of these groups, as funding for NGOs working with indigenous groups was reduced in 2016. Furthermore, land expropriation for tourism, logging and other national projects, have affected the settlement areas of these groups. The Himba, Kuvale and Zemba groups have difficulty accessing services and natural resources.

The Angolan government has adopted the UN Declaration on the Rights of Indigenous Peoples, but the San, the Himba and other indigenous peoples reportedly continue to face challenges in terms of a lack of social and economic inclusion (IWGIA, 2011).

The Angolan Constitution (promulgated in 21 January 2010 by the National Assembly) does not foresee a specific policy or law to protect the indigenous peoples of the country. There are no specific references to indigenous peoples or minorities in the Constitution, nor in other domestic law. The Government of Angola does not recognise the concept of indigenous peoples, as is affirmed in international law. Despite this, Angola has been a signatory to ILO Convention 107 on Indigenous and Tribal Populations since 1976, albeit with very limited reporting.

Angola has not indicated any interest in considering the ratification of ILO Convention 169 on Indigenous and Tribal Peoples, which effectively superseded C107 in 1989. Angola became a signatory to ICERD in 2013, and has ratified CEDAW-OP, CRC, ICCPR and CESCR, but with limited impact on its own legislation (IWGIA, 2011).

3 Legal and policy framework

Based on the nature of the project, it is inevitable that activities will lead to either land acquisition and/or denial of, restriction to, or loss of access to economic assets and resources and, therefore, ultimately to the land acquisition and compensation, and possibly resettlement, of people. It is envisioned that people and areas will be impacted by the project activities. When this occurs, relevant provisions in Angolan legislation, as well as the DBSA ESSS 4 - Indigenous People and ESSS5 - Land Acquisition, Restrictions on Land Use and Involuntary Resettlement, and IFC PS5 - Land Acquisition and Involuntary Resettlement, will apply.

3.1 Basic terms for preparation of the RPF

The resettlement framework establishes the resettlement and compensation principles, organisational arrangements and design criteria to be applied to meet the needs of the people who may be affected by the project. Furthermore, compliance with set principles will clearly indicate their commitment to sustainable development.

Compiled in accordance with the IFC PS5 and DBSA ESSS 4 and 5, this RPF covers the following sections:

- Background and project description;
- Principles and objectives governing resettlement and compensation preparation and implementation;
- A description of the process for preparing and approving resettlement and compensation plans;
- Land acquisition and likely categories of impact;
- Eligibility criteria for defining various categories of project-affected persons;
- A legal framework reviewing the fit between the laws and regulations of Angola and DBSA, World Bank/ IFC policy requirements, and measures proposed to bridge any gaps between them;
- Methods of valuating affected assets;
- Organisational procedures for the delivery of entitlements, including, for projects involving private sector intermediaries, the responsibilities of the financial intermediary, the government, and the private developer;
- Description of the implementation process, linking resettlement and compensation implementation to civil works;
- Description of grievance redress mechanisms;
- Description of the arrangements for funding resettlement and compensation, including the preparation and review of cost estimates, the flow of funds, and contingency arrangements;
- A description of mechanisms for consultations with, and participation of, displaced persons in planning, implementation, and monitoring; and
- Arrangements for monitoring by the implementation agency and, if required, by independent monitors.

The impacts of involuntary resettlement from development projects may give rise to economic, social and environmental risks resulting in production systems being dismantled, people facing impoverishment when their productive assets or income sources are lost, people being relocated to environments where their productive skills may be less applicable and the competition for resources increases; community institutions and social networks being weakened; kin groups being dispersed; and cultural identity, traditional authority, and the potential for mutual help, being diminished or lost.

The RPF may be triggered because the project activity requires land acquisition, i.e. a piece(s) of land is needed and people may be affected because they are cultivating the land, they may have buildings on that land, they may use the land for water and grazing of animals or may access the land economically in other ways, spiritually or any other way which may not be possible during and after the project is implemented. Therefore, people will be compensated appropriately for their loss (of land, property or access) either in kind or in cash, of which the former is preferred.

The RPF applies to all components under the project, whether they are directly funded in whole or in part by the DBSA. The policy applies to all affected persons regardless of the total number affected, the severity of the impact or whether they have legal title to the land. Particular attention is paid to the needs of vulnerable groups among those displaced; especially those below the poverty line; the landless, the elderly, women and children, indigenous groups and ethnic minorities, orphans, or other affected persons who may not be protected through national land compensation legislation.

The policy (DBSA, 2018) also requires that the implementation of individual resettlement and compensation plans are a prerequisite for the implementation of project activities causing resettlement, such as land acquisition, to ensure that displacement or restriction to access does not occur before necessary measures for resettlement and compensation are in place. It is further required that these measures include provision of compensation, and of other assistance required for relocation, prior to displacement, and preparation and provision of resettlement sites with adequate facilities, where required. In particular, the taking of land and related assets and infrastructures may only take place once formal agreements between parties have been reached.

Furthermore, where relocation or loss of shelter occurs, the policy further requires that measures to assist the displaced persons be implemented in accordance with the RPF and RAP. It is particularly important to manage, to the extent possible, any socio-economic pressures in the communities that are likely to be exacerbated by involuntary resettlement, by facilitating the participation of those impacted by the project activities.

Therefore, the RPF seeks to ensure that affected communities are meaningfully consulted, have participated in the planning process, and are adequately compensated to the extent that their pre-displacement incomes have been restored and that the process is fair and transparent.

3.2 Objectives of early planning and preparation of land access and resettlement

The core objective of the overall process, from a project perspective, is to secure land access. However, this objective cannot be met unless the process of planning land access and related resettlement is undertaken in a thorough and appropriate manner. Badly-managed resettlement can cause severe hardship for people, but also time, cost and reputational risk for the project. More specifically, the objectives of early project planning are to:

- Ensure that all components of the land access and resettlement process are well planned, including assessment, stakeholder engagement, implementation, and monitoring and evaluation;
- Ensure that all relevant issues and risks are dealt with, and that the project can secure access to land in a timely manner and within budget;
- Minimise land take to the extent possible, and avoid, or at least minimise, displacement to the extent practically possible;
- Ensure that displacement impacts are addressed in a manner that meets legal requirements and relevant good practice standards; and
- Ensure that projects are properly resourced and funded.

Important early planning steps in the resettlement process include the following:

- Start planning as early as possible;
- Plan and hold a project team kick-off meeting/workshop;
- Review applicable laws, standards and practices;
- Determine whether land transactions and resettlement are voluntary or involuntary;
- Carry out a precedent/benchmarking review and identify key lessons (good and bad);
- Determine key guiding objectives and principles;
- Determine project footprint and land take requirements (which must include buffer zones required for safety or other reasons, where buffer zones will result in displacement of people);
- Review land take requirements and see how displacement of people can be avoided or minimised;
- Make key planning assumptions;
- Establish the land access and resettlement team and provide them with the necessary resources;

- Establish a commitments/promises register, or incorporate promises made into existing site commitments register;
- Prepare reporting formats; and
- Hold planning workshops and meetings as required (workshops can be particularly useful for bringing people from different project areas and disciplines together to discuss key topics).

The resettlement process has the following objectives:

- Involuntary resettlement and land acquisition will be avoided where feasible, or minimised by exploring all viable alternatives;
- Where involuntary resettlement and land acquisition is unavoidable, resettlement and compensation activities will be conceived and executed as sustainable development programs. Displaced and compensated persons will be meaningfully consulted and will have opportunities to participate in planning and implementing resettlement and compensation programs; and
- Displaced and compensated persons will be assisted in their efforts to improve their livelihoods and standards of living, or at least to restore them, in real terms, to pre-displacement levels or levels prevailing prior to the beginning of the project implementation, whichever is higher. Affected people, according to the World Bank policy, refers to people who are directly affected, socially and economically, by bank-assisted investment projects caused by:
  - Relocation or loss of shelter;
  - Loss of assets or access to assets;
  - Loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or
  - The involuntary restriction or access to legally-designated parks and protected areas results in adverse impacts on the livelihood of the displaced persons.

3.3 International Guidelines

3.3.1 *IFC Performance Standard 5*

IFC PS5 on Land Acquisition and Involuntary Resettlement recognises that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/or restrictions on land use. Resettlement is considered involuntary when affected persons or communities do not have the right to refuse land acquisition or restrictions on land use, that result in physical or economic displacement. This occurs in cases of: (i) lawful expropriation or temporary or permanent restrictions on land use, and (ii) negotiated settlements in which the buyer can resort to expropriation or impose legal restrictions on land use if negotiations with the seller fail.

Performance Standard 5 requires the company (in this case the Utility – RNT) or other parties responsible for resettlement, to specify the procedures it will follow, and the actions the company will implement to properly resettle and compensate affected people and communities. The RPF is therefore a company's (for ANNA Project – RNT's) commitment to financial institutions, and to the affected people, that it will meet its obligations arising from involuntary resettlement.

3.3.2 *IFC Good Practice Handbook: Land Acquisition and Resettlement*

The IFC Good Practice Handbook: Land Acquisition and Resettlement (Draft for public comment) (IFC, 2019) provides a framework and methodology for planning, baseline data collection, implementation, monitoring and evaluation of the entire resettlement and livelihood restoration process. The handbook's key focus is keeping resettlement simple, by avoiding displacement and, where avoidance is not feasible, minimisation thereof.

According to the handbook, some key considerations for the start-up of a successful resettlement program include the following (IFC, 2019):

- Allow sufficient time for resettlement planning and consultations;
- Engage experienced resettlement practitioners early on;
- Provide internal training on resettlement standards and approach within the project organisation;
- Establish a working relationship with local government and other government agencies with resettlement-related responsibilities;
- Allocate sufficient budget;
- Invest in avoidance and minimisation of physical and economic displacement at all stages of the project design, starting with the site selection;
- Consider livelihood restoration and enhancement as a key driver for resettlement site selection where physical displacement is unavoidable;
- Start stakeholder engagement early;
- Ensure that vulnerability and gender aspects are mainstreamed in every step of the resettlement planning and implementation process;
- Establish and publicise a grievance mechanism (GM) to coincide with the start of site activities;
- Benchmark resettlement good practices; and
- Make use of experienced independent oversight professionals or advisors to regularly review and challenge a resettlement program.

3.3.3 *DBSA Environmental and Social Safeguard Standards 4 and 5*

DBSA ESSS4 (DBSA, 2018) assists the project to ensure that the development process respects Indigenous Peoples' human rights, dignity, aspirations, culture, and nature-based livelihoods.

DBSA ESSS5 addresses instances where a project acquires land, or restricts access to land, resulting in project-affected communities losing ownership or access to land, housing and related assets, and natural resources, essential for their livelihoods and income-earning capacity. It addresses the Client's responsibility to mitigate the impacts of such losses to project-affected communities.

3.4 Review of the legislation in Angola governing land acquisition and resettlement

Land administration in Angola is controlled by the following legislation:

- Law no. 9/04, of 9 November - Land Law
- Law no. 3/04, of 25 June - Law on Territorial and Urban Planning
- Decree no. 2/06, of 23 January - General Regulation of Territorial, Urban and Rural Planning
- Presidential Decree no. 216/11, of 8 August - National Policy for the Land Concession Rights
- Presidential Decision No. 14/18 of 19 February – creating the Interministerial Commission whose objective is to promote the registration of Rural Land in favor of Local Communities.
- Presidential Decree no. 117/16, of 30 May - Regulation of Rehousing Operations
- Decree no. 58/07, of 13 July, General Regulation for Land Concession
- Decree no. 79/02, of 6 December - Implementation of Norms on the Resettlement of Displaced Populations

- Decree no. 01/01, of 5 January - Norms on the Resettlement of Displaced Populations

3.4.1 *Land Law*

The Land Law (Law no. 9/04, of 9 November) states that the Angolan government owns all land, with very few formalised land rights for individual or community land occupiers. Some rural community land holdings have been demarcated and “titled” with documents filed at a provincial level. Individual farmers seldom hold a formal concession. A few commercial concessions are formalised, but the Law provides for the possibility of privatisation, albeit somewhat vaguely defined (ARD, 2005). Concerningly, the list of regulations to be promulgated under this Law is long and is difficult to achieve due to the lack of research in the implementation of the Law’s predecessor and the lack of skilled lawyers in Angola. The regulations to be promulgated include, *inter alia*, land registration, expropriation, concession granting, concession auctions, and community demarcation. Until these regulations, rules and procedures are drafted and approved, tenure types and security of tenure will remain uncertain. This may incite land takings.

The Land Law further calls for individual land owners to formalise their land rights, but the process is cumbersome, as applications have to be made to the sub-municipal and municipal authorities, geodesic services, the Ministry of Agriculture and Rural Development (MINADER) at provincial level, and the provincial governor, with each level requiring approval from the previous.

Both the Land, and Territorial and Urban, Planning laws state that the State can only expropriate land for public use, on condition that a public declaration to do so has been made.

3.4.2 *Territorial and Urban Planning Law*

The Law on Territorial and Urban Planning (Law no. 3/04, of 25 June) outlines an aggressive master planning process regarded by the government as a solution to much of the irregular urban and peri-urban development. The law bestows various rights and obligations upon citizens and legal entities, but the levels of legal literacy regarding land is low in the country. It protects the Angolan citizenry from arbitrary expropriations and eviction (ARD, 2005). In contrast, it states that irregularly occupied land may be forcibly requisitioned.

3.4.3 *National Policy for Land Concession Rights*

Presidential Decree No. 216/11, of 8 August, specifies the general basis of the National Policy for Land Concession Rights, defining the mechanisms for accessing, using and exploitation lands, taking into consideration that the access to land is fundamental for reconstruction, construction and socio-economic development of the country. It defines the following land uses, based on their main economic activity: agricultural, urban, mining and touristic, and defines the rules to establish such categories of land use. It also sets out that for public infrastructure, the land concession should consider, and protect, areas for their future expansion, as well as for maintenance and potential future developments.

Presidential Decision No. 14/18 of 19 February creates the Interministerial Commission, whose objective it is to promote the registration of Rural Land in favour of Local Communities. The Commission, co-ordinated by the Minister of State and Chief of the President's Civil House of the Republic, is responsible for surveying these lands, analysing their use and promoting the granting of land rights. In particular, it aims to survey rural or community land in rural communities; analyse the effective use of rural lands; promote the rapid recognition and registration of community-owned land and buildings under the customary domain; promote the granting of land rights to land parcels' holders that meet the legal requirements; create conditions so that the competent institutions can continue work after the term of validity of the Interministerial Commission; etc.

3.4.4 *General Regulation for Land Concession*

Decree no. 58/07, of 13 July, approves the General Regulation for Land Concession in Angola. This decree establishes the basic framework for ownership, concession and use of agricultural land in Angola. It consists of seven chapters which define all the issues related to land legislation, such as general provisions, land classification, licensing, transmission and rescission of land use rights, registration, and administration powers.

3.4.5 *Regulation of Rehousing Operations*

Presidential Decree no. 117/16, of 30 May, defines the regulations for the relocation and rehousing of families living in high density areas, in informal and precarious settlements, with the objective of providing them with better living conditions and, at the same time, make use of the areas for public purposes. This decree is applicable to areas affected by natural disasters, urban requalification, displacement of families due to public infrastructures, and distribution of housing to enhance the living conditions of the population.

It defines the procedures for these relocation operations, setting out the generic stages and approaches to be followed until the authority/entity that has responsibilities over an area has started the works for the infrastructure that was the basis for the rehousing. Should the construction works not commence within 180 days, the land rights of the area revert to the Municipal Authorities.

3.4.6 *Implementation of Norms on the Resettlement of Displaced Populations*

Decree no. 79/02, of 6 December, is mostly applicable to displaced persons, who are defined as "persons or groups of persons who have been forced or obliged to leave their homes or places of habitual residence, **particularly as a result of violence, or in order to avoid the results of armed conflict, violations of human rights or natural or man-made disasters,** and who have not crossed an internationally recognised State border;". However, it provides valuable steps to be considered when people are resettled. These steps should be considered in the preparation of the RAP and the implementation thereof, as they sensitise the implementing agencies to the circumstances of Angolan citizens, post-war. It may be a requirement to work alongside the Implementing Agencies defined in this Decree to ensure that resettlement related to the project does not overlap with resettlement projects implemented as organised resettlement, or the return of internally-displaced populations (or Angolan refugees returning to the country) by means of assistance from the relevant Government sector. It would be prudent to consider the following clauses of Article 7 in the context of the proposed project:

> *"2. a) Take into account the local administrations· priorities regarding territorial regulations in the identification of resettlement or return areas;*
>
> *2. d) Reach consensus among resident and IDPs communities on the use of land in accordance with the procedures established by the present standard operational procedures*;"

The following entities lead the resettlement and return of displaced persons, and should be regarded as stakeholders in this project:

- CNRSPDD - National Commission for Social and Productive Reintegration of Demobilised Personnel and Displaced Populations;
- CP – Provincial Commission (reporting to the CNRSPDD); and
- GADH – Ad Hoc Group for Technical and Administrative Support (reporting to the CNRSPDD).

The various roles, responsibilities, and competencies of these implementers are set out in Article 5 and 7 of the decree. It provides that the applicable Provincial Government shall provide resettled persons with "Resettlement Kits", such as seeds, agri-tools and training on the use thereof, an assessment of the area to be used for agriculture (if it is the need of the resident community), kitchen sets, hygiene materials, medical kits, building tools, shelter and clothing. Furthermore, it States that it is the responsibility of the

Provincial Government to evaluate and construct, or rehabilitate, infrastructure that has been affected in the resident community. It provides requirements for the location of healthcare units (healthcare posts, mobile clinics, hospitals, etc.) and schools for a predetermined number of people.

The abovementioned requirements indicate that the people to be resettled might be deprived of infrastructure in their local area, or, if they have already been resettled by the Provincial Government, they might be resistant towards further resettlement.

Resettlement under this decree can occur either from State funds, international or national donations, or any other legally-accepted form of funding supporting "specific projects or programmes." It might be worthwhile for the Proponent to investigate the progress of existing programs being implemented under this Decree in the area, to provide an opportunity to work together in resettling persons to their original residences where possible, instead of placing them once more in new communities.

The Norms on the Resettlement of Displaced Populations, Decree no. 01/01, of 5 January, provides for the conditions of Provincial Governments working in concert with Provincial humanitarian co-ordination groups and NGOs to assist displaced persons during resettlement. In Article 4 a), it states that *"All resettlement and return sites must be verified as free of mines".*

3.5 Gap analysis on the national legislative framework and international requirements for involuntary resettlement

The most notable difference between the Angolan legislation precedent and international best practice is probably the degree to which unregistered affected parties (PAPs residing in the area or running unregistered rented shops) are to be dealt with and their income streams restored. A second potentially-difficult issue relates to the World Bank/IFC requirements that compensation be at replacement value and not market value. In many instances, replacement value is greater than market value. Table 3.1 provides a summary of the comparison between Angolan and IFC requirements.

Table 3.1: Summary of the comparison between Angolan legislation and the IFC requirements

Category	Angolan legislation (MINAGRI, 2018)	IFC Performance Standard 5
Eligibility	Recognises possibility of transmission of property over land classified as belonging to the State's private domain. Transmission of land property and acquisition of other rights over land is authorised to individuals or associations, both national and non-national. Private property rights are limited to urban land plots. Private ownership of rural land is not permitted. Also, and in principle, rights to land use and occupation, may not be issued in rural areas occupied by rural populations. Compensation involving those who have legal titles and customary rights to communal lands.	All occupants, regardless of the legal status under which they occupy land and including both "physically-displaced" and "economically-displaced". Land owners are entitled to some form of compensation whatever the legal recognition of their occupancy. Recommends land-for-land compensation. Other compensation is at replacement cost. Land users are entitled to compensation for crops, may be entitled to replacement land and income must be restored to pre-project levels at least.
Cut-off date	No specific provision	The cut-off date is the date of completion of the census and assets inventory of persons affected by the project. Persons occupying the project area after the cut-off date are not eligible for compensation and/or resettlement assistance. Similarly, fixed assets (such as built structures, crops, fruit trees, and woodlots) established after the date of completion of the assets inventory, or an alternative mutually agreed on date, will not be compensated.

Category	Angolan legislation (MINAGRI, 2018)	IFC Performance Standard 5
Cash and in-kind compensation	No specific guide. The law says fair and adequate compensation must be paid.	Strongly favours in-kind compensation, including provision of replacement housing and replacement land with security of tenure.
Calculation of compensation	No specific guide. The law says fair and adequate compensation must be paid.	At “full replacement cost”.
Users of natural resources	No specific provision	Entitled to compensation for lost income from loss of access to or use of resources: lost income must be computed and restored to at least pre-project levels.
Consultation with PAPs and host communities	Must be carried out as specified in Section 3.4.5.	Mandatory.
Resettlement assistance	Must be provided as specified in Section 3.4.5. Fair and adequate compensation must be provided.	Mandatory.
Affected populace as project beneficiaries	No specific provision	Seen as desired project spin-off.
Owners of "non-permanent" buildings	Paying fair and adequate compensation.	Entitled to in-kind compensation or cash compensation at full replacement cost including labour and relocation expenses, prior to displacement.
Owners of "permanent" buildings	Paying fair and adequate compensation.	Entitled to in-kind compensation or cash compensation at full replacement cost including labour and relocation expenses, prior to displacement.
Perennial crops	No specific provision	Once approved by the Bank and disclosed in Angola and at the Bank infoshop.

4 Proposed inventory of affected assets

4.1 Introduction

The asset and infrastructure baseline refers to the individual and communal assets and infrastructure, fixed or moveable, that the PAPs own or have access to. The section below describes how these assets and infrastructure, that will possibly need to be relocated as a result of the proposed development project, need to be identified, counted and described in the RAP process.

The baseline socio-economic conditions of a community (community profiles) are the existing conditions and past trends associated with the human environment in which the proposed activity is to take place. The description of baseline conditions must include the relationship with the biophysical environment, social resources, culture, attitudes and social conditions, economic and population characteristics.

4.2 Undertaking inventory of affected assets

Asset and infrastructure surveys represent the most effective way of obtaining reliable quantitative data on spatial and temporal trends in the socio-economic attributes, attitudes and behaviour of a community. The below proposed methodology for undertaking the household survey include, but is not limited to, the following activities:

- Survey planning;
- Sample selection;
- Design of the survey instrument (questionnaire);
- Enumeration;
- Survey device and data processing;
- Data analysis, consolidation and reporting; and
- Recording challenges faced during fieldwork.

4.2.1 *RAP surveys*

There are three types of surveys, namely census, socio-economic, and asset and infrastructure surveys. These surveys can be done in parallel to save costs, depending on the size, nature and timeframe of the project. The planning process involves the development of the overall strategy, the structure for the survey, component plans and budget.

It is beneficial to the project if aerial surveys are done to supplement the RAP surveys. The aerial surveys can provide a quick count of the number of assets that would potentially be impacted, and the RAP surveys are then used to confirm and expand data collection.

4.2.2 *Questionnaire design*

Data collection during the survey should be undertaken by means of structured interviews guided by a questionnaire. The survey can be administered using mobile devices or paper questionnaires. Mobile devices ease data capturing but requires more intense training of enumerators. Responses from respondents, as well as GPS co-ordinates and photo numbers of assets and infrastructure of households, must be recorded on the questionnaire. The proposed household attributes assessed through a questionnaire includes, but are not limited to, the following:

- Household information (identification);
- Demographic information;
- Dwelling type (residential and other structures);
- Access to water and energy;
- Land and agriculture;

- Business enterprise;
- Health and nutrition;
- Household income and expenditure;
- Social networks;
- Needs analysis; and
- Graves.

4.2.3 *Enumeration*

The enumeration of the surveys should be done by local community members, who must be trained in survey enumeration and resettlement. The questionnaires should be checked daily by the survey fieldwork supervisor for quality assurance. Enumerators, and the fieldwork supervisor, should work under the guidance, and with the support of, the social research team for the duration of the survey.

4.2.4 *Data processing*

Data processing includes the capturing, cleaning, sorting and analysis of the data collected. When using mobile devices to administer surveys, the data processing time is cut as the data is already captured in the field. Copies of the completed questionnaires should be stored electronically and the originals should be sent to the Utility - RNT.

Quantitative data must be analysed, in addition to descriptive statistics (the proportions of respondents in various areas that gave a particular response to a given questionnaire item), and data analysis should make use of inferential techniques (e.g. estimating the degree of confidence that can be attached to a particular indicator and calculating the significance of differences among geographical areas in terms of the distribution of responses). The findings of the survey should be presented in a descriptive manner.

4.3 Challenges that may arise with RAP surveys

The following challenges may be experienced during fieldwork:

- Households may take a long time to provide personal documents such as identification documents, birth certificates, etc., as many of them have lost these during the civil war in Angola, or it is held elsewhere for safekeeping;
- Some of the household heads may not be available. The team would have to return to the household in the evening, or over a weekend, to complete the questionnaire, which could pose a safety risk;
- Some household heads may refuse to co-operate fully:
- Some households may be unable to identify graves of their late family members and this may delay the process of the graves audit, or graves may be unmarked, thus making it difficult to find the deceased's family.

4.4 Aerial asset and structures count

The section below is a summary of the assets and structures in the different project areas, that were identified during an aerial count using LiDAR images. These assets and structures are provided in the tables below and shown in Figure 4.1.

Table 4.1: Structures identified in the Angolan region of the ANNA interconnector project

Structure type	No. of structures
Thatched roof	1 634
No roof	228
Metal structures	1 552
Kraals (animal enclosures)	221

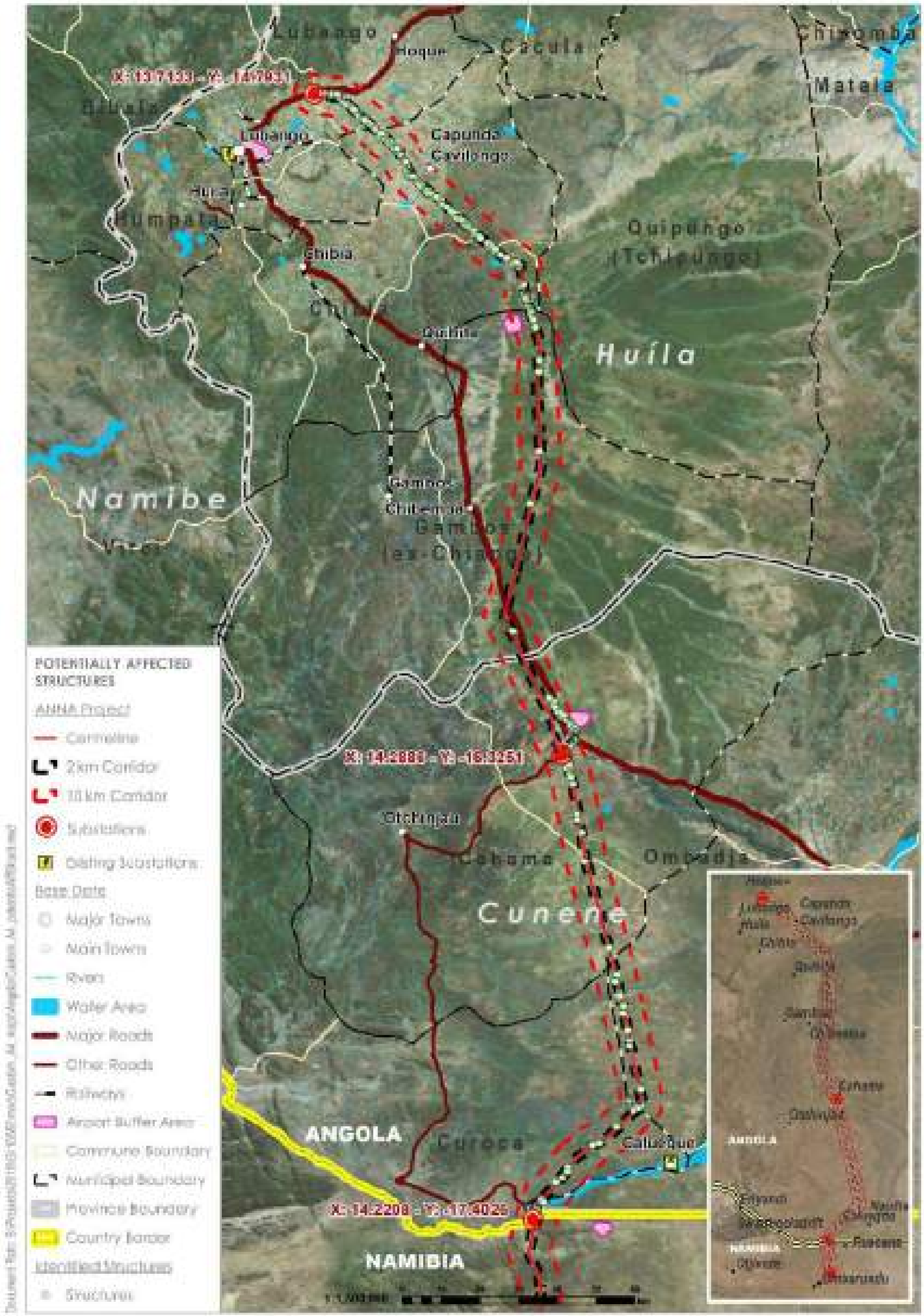


Figure 4.1: Structures identified in the Angolan region of the ANNA interconnector project

5 Compensation Framework

The RPF Compensation Framework specifies all forms of asset ownership or usage rights among the population affected by the project, and the project's strategy for compensating them for the partial or complete loss of those assets. The Compensation Framework includes a description of the following:

- The methodology that RNT and SAPP will use to valuate losses;
- The proposed types and levels of compensation to be paid;
- Compensation and assistance eligibility criteria; and
- How and when compensation will be paid.

A guiding principle is that the compensation of assets and infrastructure lost to the project should be informed by appropriate consultation and engagement with representatives of the affected communities through a Resettlement Task Team (RTT), to assess the adequacy and acceptability of the proposed compensation. The RTT will be the main mechanism for engaging the PAP, PAC and host communities. Representatives of PAC and host communities will be nominated to sit on local-level RTTs. The local RTT will constitute the project social specialist, existing structures, a community council representative and representatives of the directly-affected communities (such as an influential leader). Such consultation is especially important where market values for assets are not well established (property markets in emerging economies) or are intangible (social or cultural values that are not readily monetised).

After acceptable compensation rates are established, they can be applied to the RPF inventory of losses for all households and enterprises affected by the project. This database can then be used to budget compensation payments and to track progress in the settlement of compensation claims.

RNT and SAPP should establish a method for delivering compensation (either cash payments or in-kind allocations, as in the case of land-for-land compensation). In most cases, the Proponent will be advised to collaborate with local government authorities in the distribution of compensation payments. Those eligible for compensation should be given advance notice of the date, time, and place of payments via public announcement. Receipts should be signed by all those receiving compensation payments and retained for auditing purposes.

The payment of compensation should be monitored and verified by representatives of the Proponent, as well as representatives of the affected communities, through the RTT. It may be appropriate for the Proponent to engage the services of a registered auditing firm to monitor compensation payments.

5.1 Cut-off date

According to the IFC, the cut-off date is the date of completion of the census and assets inventory of persons affected by the project. Persons occupying the project area after the cut-off date are not eligible for compensation and/or resettlement assistance. Similarly, fixed assets (such as built structures, crops, fruit trees and woodlots) established after the date of completion of the assets inventory, or an alternative mutually agreed upon date, will not be compensated for (IFC, 2002).

One general compensation principle not captured in the matrix, is the fact that assets (agricultural plots, structures, graves, etc.) established after the cut-off date stipulated through declaration of the moratorium, will not be eligible for any compensation. When completing the resettlement planning, the RAP team and RNT need to work closely with local authorities and communities early in the project cycle to declare a cut-off date in order to freeze development and limit speculation. As mentioned by Reddy *et al*. (2015), the project should balance the need to be as transparent as possible with the need to keep the project cut-off date as confidential as possible. When the project entitlement cut-off date is announced, and surveys of the area begin, communication must be rolled out, explaining to traditional leaders and communities the need for confidentiality to protect the project's viability and to ensure that benefits will only accrue to genuinely-affected people (Reddy, G. Smyth, E. Steyn, M., 2015).

5.2 Responsibility and schedule for compensation payments

The RPF Compensation Framework specifies the organisation or agency responsible for delivering compensation to all groups eligible for resettlement assistance, as well as a timetable for the delivery of compensation. People affected by a project may have multiple compensations.

The team that would be responsible for implementing the resettlement should establish a timetable for the payment of compensation and delivery of related entitlements to each category of eligible people. It may be advisable for compensation payments to be staggered, or paid out in instalments, to allow affected people to establish themselves at the new site (to prepare farm plots, etc.). The staggering of compensation payments enables the team to determine if payments are being used for their intended purpose and, if not, to adjust the Compensation Framework accordingly. A compensation timetable can be incorporated into the overall schedule of RPF implementation timetable's deadlines, and can serve as implementation milestones for the purposes of RPF implementation monitoring.

5.3 Compensation entitlements

Compensation must include all relevant registration costs and any administrative fees and/or transfer taxes (as may be necessary) associated with relocation. Relocation costs/transport should also be made available for those who do not have formal legal title. All categories of affected people should be provided with relocation costs.

5.3.1 *Land acquisition and likely key categories of impact*

The project is not expected to result in major impacts on people, land or property, including people's access to natural and other economic resources. Notwithstanding, land acquisition, compensation and resettlement of people may be necessary. The severity of impact determines what the resettlement measures will be. For example, in the installation of transmission lines, the impact would be linear and requires land take for pylons, as well as development of an access road, and there would also be restrictions on certain activities within the 12 m servitude. The entitlement matrix presented below (Table 5.1) is so designed to assist in the process of determining the severity of impacts.

Table 5.1: Categories of PAPs potentially eligible for entitlements

<table>
<tr><th colspan="2">Affected categories</th><th>Key impacts</th></tr>
<tr><td colspan="2">The government, as legal owner of land tracts</td><td>Loss of land
Loss of fixed assets, including government structures
Loss of production, productive capability (income, service to the community)
Loss of rental income from buildings, land</td></tr>
<tr><td colspan="2">Landholders with registered rights to land</td><td>Loss of land
Loss of production, productive capability (subsistence, income)
Loss of usufruct arrangements on land
Loss of fixed assets, including homestead/business structures
Loss of rental income from buildings, land</td></tr>
<tr><td colspan="2">Unregistered landholders with socially-recognised traditional/customary rights to land</td><td>Loss of land
Loss of production, productive capability (subsistence, income)
Loss of usufruct arrangements on land
Loss of fixed assets, including homestead/business structures
Loss of rental income from buildings, land</td></tr>
<tr><td>Unregistered landholders with no recognisable legal right/claim</td><td>People with usufruct rights to land (e.g. renters, leaseholders, sharecroppers)</td><td>Loss of usufruct arrangements on, and thus access to, land
Loss of production, productive capability (subsistence, income)
Loss of fixed assets on the land</td></tr>
</table>

Affected categories		Key impacts
to land they are occupying	People who have encroached on land without legal rights or claims to land	Loss of land Loss of production, productive capability (subsistence, income) Loss of usufruct arrangements on land Loss of fixed assets, including homestead and/or business
Communities		Loss of communal assets Impeded/constrained access to facilities, services, social networks
Households/families		Loss of gravesites
Neighbouring and host communities		Loss of land (communal and private) Loss of production, productive capability (subsistence, income) Loss of usufruct arrangements on land Loss of fixed assets on the land Impacts on services, facilities and utilities

5.4 Eligibility criteria

Those who will be affected directly by resettlement and who are eligible for compensation and other assistance, require definition and identification, with criteria set for determining their eligibility.

5.4.1 *Determining criteria*

Although the responsibility for establishing eligibility criteria rests with RNT within the national and regulatory framework, the World Bank recommends that "this procedure include provision for meaningful consultations with affected persons and communities, local authorities, and, as appropriate, NGOs" (World Bank, 2004).

The World Bank defines categories of eligibility in terms of land tenure, classifying as affected people:

a) Those who have formal legal rights to land (not only the government, but including registered leasehold and customary/traditional rights recognised under law);

b) Those who do not have formal legal rights to land but have a claim under certain provisions (provided that such claims are recognised under law or become recognised through the resettlement plan); and

c) Those who have no recognisable legal right or claim to land they are occupying.

This is in recognition that the acquisition of land and associated assets will affect not only formal landholders, but other users of the resources, including people informally settled on the land, those with usufruct rights to the land, tenants, and those renting space in a homestead or business. In addition, agricultural wage labourers and employees of households and business enterprises need be regarded as eligible for assistance, if directly impacted by the loss of assets.

5.4.2 *Identifying the eligible*

All PAPs who sustain losses due to project-related causes, whether individual, institutional or communal, and whether physically displaced or otherwise, will be eligible for compensation in terms of this Policy. The PAPs will include the following categories of people:

- The population resident in areas affected by construction and operational works of the proposed project;
- Landholders and/or users of land in areas affected by construction and operational works of the proposed project;
- Those who will be economically displaced, losing income due to the loss of employment, such as employees of households and business enterprises, and agricultural labourers; and
- The host populations of resettlement areas.

Table 5.1 above summarises the categories of PAPs who are potentially eligible for entitlements.

5.4.3 *Unit of entitlement*

The project will impact on a wide range of households, business operators, institutions and community members. However, these impacts manifest at an individual and a group level. A definition of the unit of entitlement is required:

- For compensation against the loss of arable land (fields and gardens) – the unit of entitlement is the landholder and those with usufruct rights;
- For privately-held assets and resources – the unit of entitlement is the owner;
- For loss of employment – the unit of entitlement is the individual who is directly affected;
- For livelihood restoration assistance – the unit of entitlement is a household member. For example, where household subsistence and survival strategies may be disrupted through the loss of land or the relocation of business enterprises, rehabilitation measures may be extended to an adult household member or members other than the household head, to support the restoration and diversification of household livelihoods;
- For loss of communal assets (pastureland, medicinal plants, thatching grass, trees, river sand, etc.) and impeded/constrained access – unit of entitlement is the affected community through the Traditional Authority; and
- For affected grave sites – the unit of entitlement is the affected household/family.

The unit of entitlement for other losses will vary, depending on the category of affected individual/group.

5.4.4 *People without formal rights*

In compliance with IFC Performance Standard 5, the census should take into account:

- **Category 1:** People who have formal legal rights to the land they occupy;
- **Category 2:** People who do not have formal rights to the land but who have a claim to land that is recognised under the national law; and
- **Category 3:** Those who have no recognisable legal rights or claim to the land they occupy and are not recognised by the law.

Assistance should be provided to Category 2 PAPs to acquire a formal legal status before relocation. For Category 3 PAPs, in case of physical displacement, some form of social housing must be provided.

5.4.5 *Addressing human rights*

One of the most difficult issues encountered on resettlement projects, is the requirement to compensate and/or assist *bona fide* informal residents/occupants of properties. The right to adequate housing and improvement of living conditions is specifically required under IFC PS 5, which is consistent with the principles of the Universal Declaration of Human Rights (1948) and the International Covenant on Economic, Social and Cultural Rights (1966). If affected people are evicted without any assistance or relocation solutions, their fundamental right to housing, as defined by the UN Declaration of Human Rights, will be violated. For that reason, in such instances as contemplated under the IFC PS 5, it is necessary to provide alternative solutions for the accommodation of affected people living in them. It is important to note that this does not imply the need to provide affected people with ownership of apartments or houses, which is sometimes the way it is interpreted. It is rather to provide them with adequate accommodation, with security of tenure, so that they are safe from future evictions.

The IFC PS 5 stipulates that adequate housing or shelter can be measured by quality, safety, affordability, habitability, cultural appropriateness, accessibility, and location characteristics. Adequate housing should allow access to employment options, markets, and basic infrastructure and services such as water, electricity, sanitation, healthcare and education. The most appropriate and effective way of defining what adequate housing means, is to consult PAPs.

5.4.6 *Vulnerable groups*

The IFC defines special requirements for organising consultations and relocation assistance for vulnerable[1] groups. During the census, it is necessary to identify vulnerable groups and to assess their needs related to resettlement and relocation assistance. Vulnerable groups, as for all other affected people, must be engaged in meaningful consultations regarding resettlement options and assistance. However, consultation with vulnerable groups may require a special approach that will enable them to participate equally in the process (i.e. involvement of social workers, use of a different language, or carrying out the consultations in an accessible venue, including for people with disabilities, at a particular time of day when, for example, affected single parents are available, etc.).

All vulnerable citizens have the right to once-off financial payments if they find themselves in a situation of sudden and temporary need, administered through the assistance of RTT and to be determined by the Proponent at its own discretion. Vulnerable citizens also receive social welfare in the form of financial assistance or social services. Once vulnerable groups are identified during the census, a needs assessment must be performed to be able to define the most appropriate measures for providing resettlement assistance.

A separate Vulnerable Groups Plan (VGP) has been prepared and has reference in Annexure B of the Environmental and Social Management Plan (ESMP - Volume III).

5.4.7 *Equal rights*

Provisions in the RAP must ensure that compensation is shared between spouses according to title documentation or the appropriate Family Law and that man and women are treated fairly and equitably under any compensation framework. In addition, all programmes, including those related to livelihoods restoration, will be made equally accessible to both men and women and ensure that all the special needs associated with vulnerable groups area dully addressed.

This issue was also addressed in the Vulnerable Groups Plan (VGP) and has reference in Annexure B of the Environmental and Social Management Plan (ESMP - Volume III).

[1] Children, pregnant women, widows, elderly people, handicapped, migrants, malnourished people, indigenous people, people who are ill or immuno-compromised, etc.

6 Resettlement assistance and livelihood

6.1 Initial considerations

Resettlement assistance and livelihood development, sustenance and restoration programmes are included in resettlement planning when affected households stand to lose a significant portion of their livelihood resources (e.g. subsistence agricultural plots, access to important natural resources, etc.) as a result of land acquisition or resettlement. Such programmes are intended to offset the effects of those losses that cannot adequately be compensated for through monetary payments or replacement of assets – e.g. the disruption of social support networks, reduced access to markets, decreased soil productivity, the time required to reinstate agricultural plots to their former productivity, etc. – so as to ensure that resettled/compensated households are not worse off after the project than they were before. Livelihood restoration is particularly important where a project affects the livelihoods of vulnerable households (i.e. households who, because of their social or economic status, may be more adversely affected than others by a temporary or permanent loss of part of their asset base).

The socio-economic information obtained and discussed in the ESIA Report (Volume II) indicates the need to address the vulnerability of affected households. The assessment points to the low levels of education, low skills, and high unemployment among the members of households, as well as competing needs (a VGP has also been developed to provide guidelines on including these groups adequately in the consultation process – refer Annexure B of the ESMP - Volume III). However, wherever possible, the Proponent should avoid or minimise the displacement of people by exploring alternative project designs (for example the realignment of the transmission line to bypass human settlements). Where displacement is unavoidable, the Proponent should plan and execute resettlement as a development initiative that provides displaced persons with opportunities to participate in planning and implementing resettlement activities, as well as to restore and improve their livelihoods. The IFC recommends that project sponsors undertake the following actions on behalf of all affected people, including members of the host communities in which displaced people will be settled:

- Inform affected people of their options and rights concerning resettlement;
- Provide technically and economically-feasible options for resettlement, based on consultation with affected people and assessment of resettlement alternatives;
- Whether physical relocation is required or not, provide affected people with prompt and effective compensation at full replacement value for loss of assets due to project activities;
- Where physical relocation is necessary, provide assistance with relocation expenses (moving allowances, transportation, special assistance and health care for vulnerable groups);
- Where physical relocation is necessary, provide temporary housing, permanent housing sites, and resources (in cash or in kind) for the construction of permanent housing - inclusive of all fees, taxes, customary tributes, and utility hook-up charges - or, as required, agricultural sites for which a combination of productive potential, locational advantages, and other factors are at least equivalent to the advantages of the old site;
- Provide affected people with transitional financial support (such as short-term employment, subsistence support, or salary maintenance); and
- Where necessary, provide affected people with development assistance in addition to compensation for lost assets described above, such as land preparation, agricultural inputs, and credit facilities, and for training and employment opportunities.

The Proponent is expected to undertake all land acquisition, provide compensation for lost assets, and initiate resettlement, related to a specific project, before that project commences. It is recommended that the implementation of resettlement activities be linked to the schedule of disbursements for project financing. In so doing, this will ensure that displacement does not occur before the sponsor has carried out the necessary measures for the resettlement of the affected people. In particular, the acquisition of land

and other assets should not take place until compensation is paid and, where applicable, resettlement sites and moving allowances are provided to displaced persons.

As noted in the discussion of the compensation framework (Chapter 4.1), the Proponent must be sensitive to the special needs of women and other vulnerable groups in the planning and implementation of resettlement and livelihood restoration. Men and women have different needs and opportunities for access to land, resources, employment and markets.

6.2 Socio-economic assessment indicators

There may be a widespread expectation that the Proponent should provide employment opportunities to the residents in the local area. Construction activities on the proposed transmission line will create a number of temporary employment opportunities. The magnitude of this impact is related to the number of construction workers to be employed, either by the Proponent itself, or by its contractors. It is recommended that local labour is used as much as possible.

Sourcing of construction workers from the local labour pool is likely to be limited to unskilled and semi-skilled workers. This could have some economic benefits for surrounding communities, although only of a temporary nature. It is recommended that recruitment for new positions be undertaken through an Employment Forum, in partnership with local authorities (statutory in the form of the local Municipality or the Commune Administrations, and customary in the form of the Traditional Authority).

In addition to creating job opportunities for construction workers, the project may also lead to indirect employment creation in the informal sector, for instance in terms of food stalls for the convenience of construction workers. Additionally, more informal employment opportunities may be created through a multiplier effect from the project's activities.

6.3 Livelihood development and sustenance

Based on the ESIA report information, and building on this, the following livelihood development initiatives are recommended to be considered during RPF implementation:

- Make use of local labour as far as possible;
- Liaise with local community structures to identify local labour pool;
- Include conditions in construction contract to involve and train emerging companies;
- Proactively ensure that recruitment is conducted via the Employment Forum;
- Enlist the services of appropriate experts for development of an appropriate Livelihood Improvement and Sustenance Plan;
- Enhance existing livelihoods as far as possible;
- Develop Skills Transfer Plans that would enable a worker to move from one project to another within the same area/region;
- Facilitate the establishment of a "Community Safety Committee" to monitor and control illegal squatting. The committee must consist of:
  - Representatives of the community relations departments of the Proponent and its counterparts in the area;
  - The local Municipal and Communal Administrations;
  - Farmers Associations;
  - Local communities or tenants;
  - Representatives of local community structures such as the Traditional Authority; and
  - Local police and the Community Policing Forum or similar structures, if any;
- Align social investment strategies with municipal and provincial development plans or strategies;
- Proponent employees who receive living-out allowances should be required to provide proof that this allowance is used for formal accommodation;

- Additional security must be provided during this period by the contractors, who should be integrated with existing farm/community security systems; and
- Align awareness campaigns with those of other organisations in the area (i.e. the local authority, NGOs, etc.).

6.3.1 *Resettlement assistance*

The RPF Implementation Team, in conjunction with the RTT, must design appropriately targeted resettlement assistance measures to ensure that the vulnerable groups are catered for during resettlement process. There are a number of vulnerable groups who should receive special attention during the resettlement process. These could include:

- Female-headed households;
- Pregnant and lactating women;
- Indigenous Peoples;
- Mentally and physically-challenged (including amputees) people;
- Orphans;
- Infirm people;
- Migrant Populations; and
- The elderly.

6.3.2 *Community-based resettlement assistance*

The provision of basic services within areas of resettlement should be prioritised as far possible. This must include access to primary health care and referral systems, potable water, sanitation facilities and education. The RTT, with the support of the relevant operational agencies, will assess the current basic services operating within resettlement areas. Critical gaps must then be identified and drawn-up into a prioritised list of interventions. Efforts should be made to restore basic service coverage within a reasonable timeframe, so as to avoid further dislocation of the resettling population. Information gathered on the status of basic services will be entered into a management information system to support targeting and monitoring.

6.3.3 *Information and sensitisation*

A clear and coherent information and sensitisation campaign is a crucial component of the resettlement process. Lack of clarity or inconsistency in information provision runs the danger of exposing government and non-government staff to security risks, and of impeding the smooth flow of the resettlement process. The central aim of the information and sensitisation campaign is to ensure that the wider public, particularly all PAPs, are informed about:

- The safety status of their intended resettlement area;
- Procedures for the phasing-down of affected informal settlements, as presented in the Resettlement Strategy; and
- Entitlements and support services provided within the resettlement programme procedures and designated areas for accessing entitlements.

The information campaign is the responsibility of the Proponent, who must work closely with the RTT. The campaign will make use of existing information dissemination and consultation mechanisms within the local authority and the wider communities, using indigenous information networks at the appropriate-level for supporting resettlement. The use of other media, such as radio, can be also employed.

6.4 Summary of livelihood recommendations

It is recommended that the mitigation and optimisation measures included in the entire RPF Report be implemented, to decrease the effect of negative impacts on communities, and optimise the effect of positive impacts on communities. It will be important that local employment opportunities are maximised, that the local community is fully engaged in decision-making processes, recommended mitigation measures are followed by other specialists, and that opportunities for income creation for local people are maximised.

It is further recommended that labour should be sourced locally as far as possible during the construction and operation of the project. This will minimise the risk of conflict among local residents and newcomers, and improve relationships for construction workers housed in temporary housing.

Furthermore, new construction workers in the area must refrain from abusing resources and infrastructure of the existing adjacent communities. There should be closer co-operation between the Municipal and Communal Authorities, the Traditional Authority and the Proponent in order to ensure that identified negative impacts are dealt with in a co-ordinated manner. This information should be conveyed to all relevant construction workers and affected communities.

7 Budget

The detailed budget must be developed by the Proponent once the valuation of the project-affected properties has been undertaken. The RAP budget should be linked with a detailed implementation schedule for all key resettlement and rehabilitation activities. The consulting work for developing the RAP would cost between ~USD 300 000 and ~USD 500 000, depending on the number of PAPs, travelling costs, number of engagements, political interference, disagreement on compensation, project design changes, etc.

At this stage, final values of assets and infrastructures to be lost to the project could not be determined. A cost estimate of the physical resettlement in Angola, including a 15% disturbance allowance, is summarised in Table 7.1. The costs below are only an estimate and should be confirmed during the RAP.

Table 7.1: Estimated by category and estimated budget for compensation

Item for compensation	Unit	Rate (US$)	15% (disturbance)	Total no. of units to be compensated	Sub-total compensation cost (USD)
Value of land (long leasehold loss)	ha	$ 4,000.00	$ -		$ -
Value of land (concession or provisional title/land loss)	ha	$ 1,500.00	$ 89,640.00	398.4	$ 687,240.00
Value of structures/ buildings	Item	$ 1,500.00	$768,150.00	3414	$ 5,889,150.00
Kraals	item	$ 1,000.00	$ 33,150.00	221	$ 254,150.00
Total					**$ 6,830,540.00**

8 Implementation schedule

It is commonly understood that the involuntary displacement of people may give rise to severe economic, social, and emotional distress on the part of those who are relocated. As for Angola, the resettlement legislation mainly has a bearing on land restitution and resettlement associated therewith. However, some aspects stipulated in this legislation and policies need to be considered in the compilation of the RAP, to limit adverse effects where resettlement is necessary (since *resettlement* in this country might have negative connotations, such as the reminder of civil war or colonialism). These instruments should be utilised in conjunction with this RPF, as well as IFC, World Bank and DBSA policy.

The purpose of these guidelines is to lay the foundation from which resettlement can be carried out with regard to the project. Any involuntary resettlement, including any land acquisition, needs to be identified and considered at the earliest stages of project design, and should be addressed from the earliest stages of project preparation. It is assumed that land acquisition and resettlement will be necessary and, to this end, the policies highlighted in this RPF should be followed. For Angola, the legislation identified in Section 3.4, as well as the World Bank Policy, will be utilised.

The resettlement implementation schedule should be synchronised with the overall project implementation schedule. An example of an implementation schedule is provided in Table 8.1.

Table 8.1: Proposed implementation schedule to be used in RAP

Tasks	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9
Completion of Draft RAP									
Approval of Draft RAP									
Community Consultation Program (ongoing)									
Negotiation for relocation sites									
Contractor receives approval									
Confirmation of relocation sites									
Set up Community-based organisation									
Notification of entitlements									
Contractor tower spotting / testing									
Agreement of entitlements									
Notification of demolition									
Payment of compensation to PAPs									
Establish linkages with government programs									
Contractor excavation work									
Grievance mechanism and procedures									
Preparation of site plan and site									
Construction of new structures									
Demolition of old structures									

Tasks	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9
Movement of PAPs to new sites									
Contractor constructs towers									
Contractor strings lines									
Training program									
Performance monitoring									
External evaluations (externally for two years)									

Key		RAP Activities		Construction Activities

Adapted from an Implementation Schedule, out of the IFC Handbook for Preparing a Resettlement Action Plan, 2002

8.1 Resettlement responsibilities

A resettlement specialist must be appointed by the project sponsor before the detailed design phase, in order to identify assets that can be avoided. The resettlement specialist will ensure project-affected persons are meaningfully consulted and are given an opportunity to participate in, and benefit from, project activities.

8.2 Resettlement principles

In the resettlement of any person or business, the IFC policies will be followed, as well as the principles as set out in relevant Angola legislation, and as per those principles documented in this RPF.

8.3 Timeframes

The following key timeframes shall apply, unless otherwise agreed upon between the Proponent and the resettlement specialist, the RTT and the PAPs, provided that no agreement to waive the timeframes shall adversely affect the rights or interests of PAPs under this framework:

- The inventory shall be completed by at most four months prior to the commencement of the demining and construction works; and
- Any site works shall only commence once agreements between all parties have been reached.

Comprehensive timeframes shall be drawn up and agreed upon by all parties including the PAPs. Compensation payments for acquired land and affected assets, and resettlement of households as described above, must be completed as a condition for the taking away of land, and before commencement of the civil works under the project.

It is envisaged that most PAPs who need be relocated will have to move their homesteads, rather than having to move to a new location altogether. However, adequate time and attention shall be allowed for consultation of both the displaced and host communities before bringing in the "newcomers", if relevant. The actual length of time will depend on the extent of the resettlement and compensation, and will have to be agreed upon by all parties.

8.4 Linking resettlement implementation to civil works

PAPs will need to be compensated in accordance with this RPF and with subsequent compensation framework, before work on the project can begin.

For activities involving land acquisition, or loss, denial or restriction to access of resources, it is required that provisions be made for compensation and for other assistance required for relocation, prior to displacement. The assistance that the Proponent needs to provide includes provision and preparation of resettlement sites with adequate facilities.

In particular, land and related assets may be taken away only after compensation has been paid, and once resettlement sites and moving allowances have been provided to PAPs. For project activities requiring relocation, or resulting in loss of shelter, the resettlement policy further requires that measures to assist the project-affected persons are implemented in accordance with this RPF. In the implementation schedule of the RPF, details on resettlement and compensation must be provided. The schedule for the implementation of activities, as agreed upon between the project planning teams and PAPs, must include:

- Target dates for start and completion of civil works;
- Timetables for transfers of completed civil works to PAPs, and dates of possession of land that PAPs are using (this date must be after transfer date for completed civil works to PAPs and for payments of all compensation); and
- The link between RPF activities to the implementation of the overall project.

When approving recommendations for resettlement during screening, PAPs must confirm that the resettlement plans contain acceptable measures that link resettlement activity to civil works, in compliance with this policy. Proper timing and co-ordination of the civil works shall ensure that no affected persons will be displaced (economically or physically), due to civil works activity, before compensation is paid and before any project activity can begin.

9 Description of organisational responsibilities

The entities that will play significant roles in the resettlement process include the programme manager, the resettlement implementation team (RIT) and an RTT, local authorities (statutory and customary), as well as the Proponent. This chapter sets out the relationship between these various entities, as well as the roles and responsibilities of each.

An RTT will be established by the RIT, as part of the resettlement planning process, and will be responsible for planning and co-ordinating resettlement activities. The RTT will include representatives of resettlement-affected households, local authorities (statutory and customary), the RPF implementation team, as well as the Proponent. The RPF implementation team will be made up of representatives from the Proponent, as well as an appointed resettlement specialist.

9.1 Programme manager

The resettlement implementation programme manager (PM) has the overall responsibility for achievement of resettlement goals. The PM is responsible for receiving regular reports on resettlement implementation progress, including reasons for any delays or variations from the RPF, as well as proposed corrective actions. The PM will provide status reports to the Proponent's management, lenders, and stakeholders, as required. The PM may commission input advice from specialist advisors as required.

9.2 Resettlement team co-ordinator

The resettlement team co-ordinator (RTC) reports to the PM and has the day-to-day responsibility of the development and on-going stewardship of the RPF. The RTC will co-ordinate all resettlement implementation activities and will work closely with the RPF implementation team (including the monitoring and evaluation of the resettlement activities).

9.3 Resettlement advisor

The draft RAP must be reviewed by an expert advisor who will provide high-level input and guidance prior to documents being endorsed for distribution and implementation.

9.4 Local-level resettlement task teams

The RTT will be the main mechanism for engaging the resettlement-affected persons and communities[1]. Representatives of resettlement-affected communities must form part of the RTT.

The members of the resettlement-affected communities, who will be nominated to sit on the local-level RTTs, will have the following responsibilities:

- Ensuring the concerns and viewpoints of affected persons and households regarding resettlement and compensation measures are accurately represented on, and disclosed to, the RTT;
- Participating in negotiations and planning with regards to compensation and resettlement measures;
- Accurately indicating the agreement or disagreement with proposed compensation and resettlement measures and, in the case of the latter, proposing viable alternatives;
- Accurately and regularly providing feedback to the broader community – and particularly to other resettlement-affected households – on resettlement/compensation negotiations and the resettlement/compensation process in general; and

[1] A resettlement-affected person is defined as any individual or household who will need to be relocated or will have one or more of his/her assets displaced or otherwise affected by the construction or operation of the ANNA Project. *(IFC PS 5 on Land Acquisition and Involuntary Resettlement)*

- Providing a channel of communication between the RIT and the resettlement-affected community during the implementation of resettlement and compensation – e.g. by helping to ensure that the RTT is notified of grievances or disputes, that feedback is provided to the relevant parties on steps taken to resolve such grievances or disputes, etc.

9.4.1 *Representatives of local authority*

The responsibilities of members of the relevant local authorities, who will be nominated to sit on the local-level RTTs, will include:

- Ensuring the concerns and viewpoints of the local authority, regarding resettlement and compensation measures, are accurately represented on, and disclosed to, the RTT;
- Ensuring the local development plans, policies and by-laws are taken into account during the design, planning and implementation of resettlement and compensation measures; and
- Accurately and regularly providing feedback to the local authority on resettlement/compensation negotiations and the resettlement/compensation process in general.

9.4.2 *Representatives of traditional authorities*

The responsibilities of members of the traditional authorities (TAs) who have been nominated to sit on the local-level RTTs include:

- Ensuring the concerns and viewpoints of the TA, regarding resettlement and compensation measures, are accurately represented on, and disclosed to, the RTT;
- In cases where resources or actions by the TA are required as part of resettlement or compensation planning or implementation (e.g. where land within its area of jurisdiction must be allocated to affected households to replace land lost to the project), ensuring that the relevant parties are informed, and the required actions taken in a timeous manner; and
- Ensuring that representatives of the resettlement-affected community, who are members of the RTT, provide accurate and regular feedback to the broader community on RTT actions and decisions, and providing assistance in this regard where necessary.

9.4.3 *Resettlement Implementation Team*

The resettlement implementation team (RIT) comprise of representatives from the Proponent and the RTC, as well as an appointed resettlement implementation specialist, and will have the following key responsibilities:

- Chair all local-level RTT meetings;
- Provide secretarial services which include, among others: take minutes and formally distribute these minutes to all stakeholders;
- In consultation with RTT members, determine the dates, times and locations of future RTT meetings, and distribute an agenda for each meeting to RTT members;
- Consider the prepared compensation framework outlining proposed resettlement and compensation measures, and present this to the RTT in such a manner that all members understand its contents and implications;
- Recording recommendations of the local-level RTT with regards to proposed changes to the Compensation Framework and/or other matters related to resettlement or compensation;
- In cases where the local-level RTT is unable to reach consensus regarding its recommendations, and some members have a well-motivated alternative recommendation, formally recording these alternative viewpoints as “minority reports”;
- Where relevant, advising on the feasibility and sustainability of RTT recommendations;
- Providing feedback to the Proponents and the engineering teams on the deliberations of the RTT, particularly where these may affect broader project planning and implementation;

- Co-ordinating and monitoring field-level implementation of resettlement and compensation activities; and
- Ensuring the grievances or disputes lodged with the RTT are dealt with appropriately and timeously by the relevant parties, and that feedback on steps taken to address these grievances or disputes are given to the aggrieved parties.

9.4.4 *Proponent representatives*

The responsibilities of the representatives of SAPP, DBSA and RNT on the local GRT include:

- Ensuring that the land acquisition process being undertaken by the Proponent is adequately considered during the deliberations of the RTT and during the design, and planning of resettlement and compensation measures;
- Assisting the RIT in providing feedback to the Proponent's engineering teams on the deliberations of the RTT, particularly where these may affect broader project planning and implementation; and
- Assisting the RIT in ensuring the grievances or disputes lodged with the RTT are dealt with appropriately and timeously by the relevant parties.

9.5 Resettlement implementation team

The responsibilities of the resettlement implementation team (RIT) include:

- Chairing all RTT meetings, taking minutes and formally distributing these minutes;
- In consultation with RTT members, determining the dates, times and locations of future RTT meetings, and distributing an agenda for each meeting to RTT members;
- Collating inputs from representatives of the local-level RTTs with regards to proposed changes to the Compensation Framework and/or other matters related to resettlement or compensation;
- Where consensus can be reached between local-level RTTs regarding proposed changes to the Compensation Framework, recording these proposed changes as formal "recommendations of the RTT";
- Where the representatives of constituent local-level RTTs are unable to reach consensus regarding their recommendations, formally recording alternative viewpoints as "minority reports";
- Submitting recommendations of the RTT to the Proponent for consideration regarding their potential inclusion in the final compensation framework; and
- Revising the Compensation Framework to reflect those recommendations of the RTT that are accepted by the Proponent and presenting the final compensation framework to the RTT members.

9.5.1 *Proponent representatives*

The responsibilities of the representatives of SAPP, DBSA and RNT on the RIT include:

- Considering the formal recommendations of the RTT with regard to their potential inclusion in the compensation framework, taking into account the need for any modifications of the compensation framework to remain consistent with the Proponent's policies and project objectives; and
- Where recommendations of the RTT are considered acceptable, approving changes to the compensation framework to reflect these recommendations.

9.6 RTT meetings

The RTT will meet at least once a month during implementation of resettlement activities. Thereafter, the RTT will meet once every three months, for a period of one year, to address any outstanding issues.

The RTT will be chaired by the RIT. The agenda for the RTT meetings will be clearly drafted and, at every meeting, the RTT will first review the progress of decisions taken, and action points recorded, at the previous meeting.

Meetings will be held at a venue to be decided in consultation with all parties. The resettlement implementation team will transport the members of the RTT to the venue, should it be required. The secretariat representing the RIT will keep, and distribute, formal minutes of each meeting.

RTT members may invite observers, subject to the approval of the RTT. Observers may address the RTT but their contributions will only be accepted as "recommendations to the RTT" if it receives the support from the parties listed in Section 9.4.

9.6.1 *Quorum*

A quorum requires 60% of RTT members present, and must include:

- The chair (or nominated representative);
- A nominated representative of the TA concerned;
- A representative of the RIT;
- At least one member of impacted land users; and
- A representative of the Proponent.

If a quorum is not available within 15 minutes of the called meeting, the meeting will be cancelled. Another meeting will be called immediately. The members present will constitute a quorum. In order to constitute a recognised quorum, this group should include the abovementioned people.

9.6.2 *Recommendations of the RTT*

The RTT will provide advice and support to the RIT. The formulation and approval of RTT recommendations will comprise a three-step process. First, recommendations reflecting consensus among members of a local-level RTT will be collated and presented. Next, recommendations tabled at meetings of the RTT that are acceptable to all members, will be recorded by the RIT (with well-motivated, alternative viewpoints recorded as "minority reports") and submitted to the Proponent for consideration. Finally, those recommendations accepted by the Proponent will be incorporated into the final version of the Compensation Framework, to be submitted to the RTT for endorsement and to the Proponent for approval and signoff.

It is anticipated that the RTT will make recommendations regarding the following issues:

- Design of replacement houses and structures;
- Compensation for fixed assets other than houses/structures;
- Compensation for affected community facilities/infrastructure;
- Compensation for fields, crops and communal grazing;
- Assistance with the identification of a resettlement site (replacement land);
- Development and livelihood restoration options; and
- Grievance procedures, disputes and claims.

9.6.3 *Allowances*

Only community representatives participating in RTTs should receive an allowance.

9.6.4 *Relationship between the RTT and other co-ordination bodies*

The setting up of this RTT is not intended to duplicate existing co-ordination mechanisms, such as other project working groups and work streams. Rather, it is to act as a focal point to which existing committees can both provide inputs, and through which to co-ordinate the implementation of their sectoral responsibilities contained within the RAP.

10 Framework for stakeholder engagement, participation and development planning

Public consultations, in relation to the RPF, occur at all stages, starting with inception and the planning of when the potential land and alternative sites are being considered. A participatory approach shall be adopted as an ongoing strategy throughout the entire project cycle.

Public participation and consultations take place through individual, group, or community meetings. Additionally, radio programs and other media forms may be used to further disseminate information. PAPs are consulted in the survey process in the form of public notices, where explanations of the project are made including the resettlement process and implementation of activities. Selection of ways to consult and to expand participation by PAPs and other stakeholders, will take into consideration literacy levels prevalent in affected communities, ethnicity and cultural aspects, and practical conditions (like distance).

The role of traditional political and cultural leaders, including the community elders, in the participation strategy, will be important. The resettlement implementation team should ensure that these leaders and local representatives of PAPs are fully involved in designing the public consultation procedures.

The IFC PS 5 on Involuntary Resettlement stipulates that "*people affected by the project must be: consulted regarding resettlement activities*..." Furthermore, the IFC Handbook (IFC, 2002) for preparing a RAP sets out the following requirements for consultation and communication during a RAP:

- Consultation with local government, community leaders and affected people representatives: "*Consultation with officials of local government, community leaders and other representatives of the affected population is essential in gaining a comprehensive understanding of the types and degrees of adverse project effects*".
- Consultation with host communities: "*Consultation involving representatives of both host communities and the communities to be displaced helps to build familiarity and to resolve disputes that inevitably arise during resettlement*".
- Requirement for a resettlement advisory group and composition: "*Depending on the scale of resettlement associated with a project, it may be appropriate for the sponsor to create a resettlement advisory group. This advisory group should comprise representatives of the project sponsor, relevant government line and administrative departments, community organisations, NGOs involved in support of resettlement as well as representatives of the communities affected by the project*".
- Purpose of consultations: "*Early consultation helps to manage public expectations concerning the impact of a project and its expected benefits. Subsequent consultations provide opportunities for the sponsor and representatives of the people affected by the project to negotiate compensation packages and eligibility requirements, resettlement assistance and the timing of resettlement activities. Project consultation with people affected by resettlement is mandatory*".

10.1 Objectives of stakeholder engagement in the resettlement process

Undertaking stakeholder engagement without clear objectives is no different from developing a project or undertaking any human endeavour, without objectives, i.e. efforts will lack focus. It is useful to disaggregate stakeholders and develop engagement objectives for each group. The overall objective of stakeholder engagement is to obtain and retain broad community, and other stakeholder, support to enable the project to develop, operate and expand peacefully. Broad community support is a collection of expressions by affected communities, through individuals and their recognised representatives, in support of the project. There may be broad community support, even if some individuals or groups object to the project. An important secondary objective is that, through meaningful engagement, stakeholders can influence the design and implementation of projects for mutual benefit. The objectives of formal consultations are to secure the participation of all people affected by the project in their own resettlement planning and implementation, particularly in the following areas:

- Alternative project design;
- Assessment of project impacts;
- Resettlement strategy;
- Compensation rates and eligibility for entitlements;
- Choice of resettlement site and timing of relocation;
- Development opportunities and initiatives;
- Development of procedures for redressing grievances and resolving disputes;
- Mechanisms for monitoring and evaluation and for implementing corrective actions; and
- Information sharing: "*Information must be made accessible and understandable. Information should be translated into local dialects and indigenous languages and broadcast through media that is accessible to literate and illiterate individuals alike. Special efforts should be made to reach vulnerable groups*..."

10.2 Principles of engagement

The following principles for engagement have been identified for the purposes of effective resettlement planning. These are to be upheld throughout all engagement processes, and the means of engagement modified if required, to ensure that these are met:

- Transparency to all parties;
- Involvement of all affected parties (inclusivity);
- Information sharing;
- Informed decision-making;
- Flexibility in terms of approach; and
- Independence and objectivity of the RIT to be maintained.

The success of projects involving communities rests on appropriate community participation and involvement from the planning stage through to implementation. Hence, public consultations through participatory rural appraisal must be mandatory for all projects requiring land acquisition, compensation and resettlement for the Proponent's project activities.

During resettlement planning there must be adequate consultation and involvement of the local communities and the affected persons. Specifically, the affected persons must be informed about the intentions to use the earmarked sites for the proposed activities and infrastructure. The affected persons must be made aware of:

- Their options and rights pertaining to resettlement and compensation;
- Specific technically and economically-feasible options and alternatives for resettlement sites;
- Process of, and proposed dates for, resettlement and compensation;
- Effective compensation rates at full replacement cost for loss of assets and services; and
- Proposed measures and costs to maintain or improve their living standards.

The aim of stakeholder engagement at the planning stage will be to:

- Disseminate concepts for proposed project activities with a view to provoking project interest amongst the communities;
- Promote a sense of ownership of the project and resettlement activities;
- Invite contributions to, and participation in, the selection of project sites;
- Determine communities' willingness to contribute in kind towards the implementation of the project; and
- Determine community willingness to contribute towards long-term maintenance of the project facilities.

10.3 Communication strategy

Aurecon has developed a stakeholder engagement plan (SEP – Annexure A of the ESMP – Volume III) for the respective countries in which the project is proposed, which shall be updated throughout the project, to remain flexible to the needs of the stakeholders.

The RPF engagement has been undertaken to meet the following objectives:

- Awareness and information sharing: This element started in 2019 through meetings with the local authorities, creating awareness about the project and associated activities. This was part of the Environmental and Social Impact Assessment (ESIA) notification process. Awareness building and information sharing will continue throughout the ESIA process and will need to continue throughout project implementation. Thus, it is anticipated that stakeholders will be involved in information sharing around resettlement for two to three years minimum, prior to resettlement taking place.
- Involvement in decision making: The RPF has been prepared to allow affected party input into the document. It is intended that the RPF Report will be made available for public as part of the stakeholder engagement process for the ESIA.

10.4 Consultation and stakeholder engagement activities to date

Consultation and stakeholder participation activities, that have been undertaken in the Angolan section of the project area, are detailed below.

The initial stakeholder consultation and public participation processes took place during meetings with local authorities as part of the ESIA process. This process sought to make communities and stakeholders aware of the proposed project and to afford them a formal opportunity to be introduced to the project. Stakeholders were also given an opportunity to make inputs and raise issues of concern that should be considered in the project planning phase. The meetings were held as follows:

- During the Pre-feasibility and Screening Phase of the project and whilst stakeholders were being identified, the Angolan Ministry of Environment (Ministério do Ambiente - MINAMB) was consulted and asked which other parties should be included on the stakeholder registry.
- A pre-application meeting was held with DNPAIA on 3 September 2018 with Aurecon and representatives from RNT, to introduce the project and to ensure that the ESIA process to be followed is in line with the requirements and/or expectations of MINAMB/DNPAIA.

Meetings were held with the local authorities and communities in Angola at the following locations (Table 10.1):

Table 10.1: Meetings held with the local authorities and communities

Date	Interviewed entity	Name of representative (s)	Role
10 April ‘19	Huíla Provincial Government	Nuno Mahapi	Deputy Administrator
10 April ‘19	Hoque Communal Administration Soba Hoque	Paulo Caluimbo; Jose Manuel Amuciça	Assistant Administrator; Soba
11 April ‘19	Chibia Municipality	Eduardo Comena Audalo	Assistant Administrator, Social Sector
11 April ‘19	Capunda-Cavilongo Communal Administration	Jaime Federico	Administrator
12 April ‘19	Gambos Municipality	Julieta Vitoria Casseça; Fernando Manuel	Assistant Administrator Economic and Social Sector; Assistant Administrator, Financial Sector
13 April ‘19	Inhabitant Hoque	Bernardo	Inhabitant

Date	Interviewed entity	Name of representative (s)	Role
14 April '19	Inhabitants Cahila	José Viçaca (Tristeza); Beto Amaral	Inhabitants (representatives of civil defence)
14 April '19	Soba Chimbolelo settlement	Mulango Katiko	*Soba*
15 April '19	Chimbemba Communal Administration	Antonio Chipinga	Administrator
15 April '19	Cahama Municipality Administration	Lurdes Maçedo de Oliveira	Administrator
15 April '19	Cahama Communal Administration Soba Cahama	Daniel Eusebio; Moises Veranda	Administrator *Soba*
16 April '19	Otchinjau Communal Administration	David Calaungela; Beto Fernando	Economic section; Community organisation
16 April '19	Soba Matatona	Muamapi Cuatcienda	*Soba*
16 April '19	Ombadja Municipality	Albertina José; Venancio Miguel Dias; Adam Jambu; Reino Toxas	Administrator; Chief political section; Chief technical section; Chief secretary/administrative
17 April '19	Naulila Communal Administration	Colmincil Elisando Santos (Kid)	Administrator
22 April '19	Humbe Communal Administration	Aguinaldo Cauna; Wilson Pinto; Feliciano Lonato	Head of technical department; Head office administrator; Soba Secretary
23 April '19	Cahama Air Force Base	Neves Cachimbanba	Commander of the Air Force Base
23 April '19	Cahama Municipality Administration	Nicolau	Assistant Administrator, Finance
24 April '19	Quihita Communal Administration	Alfredo Moreno; Paulo Pianbundo; Ana Daniel	Administrator; Chief Secretary; Assistant Administrator
25 April '19	Lubango Municipality	Armando Baptista de Santos Vieira	Administrator
26 April '19	Sobas Quihita	Joaquissimo Samba	*Soba Grande*

10.5 Planned engagement activities

The stakeholder engagement activities still to be undertaken include:

- Public consultation of the project within the ESIA process, as required by Angolan legislation and best practice. All documents compiled for the ESIA process, namely the ESIA report, the ESMP, the SEP, the VGP and this RPF, will made available for consultation and all comments received will be used to update the applicable documentation so that the project's way forward includes all relevant information;
- Establishment of an RTT, which is the primary mechanism for engaging resettlement-affected households, and other relevant stakeholders, in resettlement planning. It is understood that the RTT's primary function will be to disseminate information about the resettlement and compensation process to affected communities (although not precluding individual consultations with individual affected households, which will take place during resettlement implementation). In order to avoid the creation of unrealistic expectations, the negotiation of compensation amounts and methods, will be explicitly excluded from its mandate – although the RTT may be consulted in cases where more than one feasible option for compensation exists;

- Focus-group discussions to be held by the resettlement planning team to obtain additional information and to address the affected population’s concerns regarding resettlement; and
- Consultation by the resettlement planning team with individual resettlement-affected household heads (or their authorised representatives) to inform them of their compensation packages and to obtain their agreement on compensation amounts and means.

10.6 Notification procedure

The Project (through the appropriate Project Implementing Agent – PIA) must, by publicly announcing the project in the media (daily newspapers, radio) or other means considered appropriate for the local reality, notify the PAPs of its intention to acquire land earmarked for the project. The notice must contain the following key information:

- Proponent’s proposal to acquire the land;
- The purpose for which the land is needed;
- That the proposal or plan may be inspected by the offices of the relevant local Authority during working hours; and
- That PAPs may, by written notice, object to the transaction, giving reasons for doing so, to the PIA with copies to the relevant local government and traditional authorities within 14 days of the first public announcement or appearance of the notice. Assurances must be made that affected persons have received this information and notification.

10.7 Stakeholder engagement mechanisms

Public consultation and participation are vital because it provides an opportunity for informing the public and stakeholders about the proposed project. Public consultation and participation create a sense of ownership of the project, providing an opportunity for people to present their views and values and allowing consideration and discussion of sensitive social mitigation measures and trade-offs.

Public consultation and participation will offer the PAPs an opportunity to contribute to both the design and the implementation of the programme activities. In doing so, the likelihood for conflicts between, and among, the affected, and with the management committees, will be reduced. In recognition of this, particular attention should be paid to public consultation with PAPs, households and homesteads (including host communities) when resettlement and compensation concerns are involved. As a matter of strategy, public consultation must be an ongoing activity taking place throughout the entire project cycle. Hence, stakeholder engagement shall take place during the following phases of the project:

- Project inception and planning;
- Screening process;
- Feasibility study;
- ESIA;
- Preparation of project designs;
- Resettlement and compensation planning;
- Drafting and reading/signing of the compensation contracts;
- Payment of compensations;
- Resettlement activities; and
- Implementation of after-project community support activities.

Public consultation and participation should take place through local meetings, requests for written proposals/comments, completion of questionnaires/application forms, and public readings and explanations of the project ideas and requirements. Public documents should be made available in appropriate languages at the national, local and homestead levels, and at suitable locations including the official residences/offices of village governments and relevant Sobas. Public consultation measures should take into account the low literacy levels prevalent in the rural communities, by allowing enough time for discussions, consultations, questions and feedback.

10.8 Promoting participation

The IFC standard for resettlement (PS5) recommends that the project proponent must initiate and facilitate a series of consultations with project stakeholders throughout the planning and implementation of resettlement. The purpose of these consultations is to inform stakeholders about the project and its effects, and to provide opportunities for people to voice their concerns and to propose alternatives. Formal consultations should include RNT representatives, project managers, relevant government authorities, representatives of concerned NGOs, and members of both displaced and host communities. Discussions should centre on the effects of the project and measures to mitigate those effects. Because of discrimination within societies in general, women and members of other vulnerable groups may find it difficult to defend their interests in a public forum. For this reason, it is important for project management, or the resettlement planning and implementation teams, to employ women and members of other vulnerable groups, in particular members of the indigenous population. These staff members can undertake outreach efforts, such as focus group consultation, to learn the concerns of vulnerable groups and convey them to resettlement planners and project managers.

10.9 Implementation phase

During implementation, PAPs will be informed about their rights and options. The Grievance Mechanism (refer to Section 11) will continue to operate, and all grievances will be recorded. The participation of the RTT, local leaders and PAPs in disseminating information and resolving disputes, will be important once resettlement implementation starts. A dynamic participatory approach involves PAPs in decision-making about livelihood and community development programmes.

10.10 Conclusion

In conclusion, the Proponent, through the Project Implementation Agent (PIA), may employ community liaison representative(s) with a budget specifically for the facilitation and management of public consultation. However, if they choose to manage information disclosure and public consultation, the Proponent must ensure that affected people have access to information about the project and to opportunities through which to seek redress of grievances relating to the project (refer to Section 11). Project management must document its information disclosure and public consultation efforts. This documentation should identify who was consulted, what was discussed, and what follow-up was required.

It is expected that consultation with all the established resettlement structures will continue beyond the completion of the planning phase, and into the implementation stage of the project (as shown in Figure 1.4), which will be undertaken by the PIA. Exact dates for this consultation cannot be determined at this stage, as infrastructure planning and design, which may influence the scope of RAP, must be considered.

11 Provisions for redress of grievances

Grievance mechanisms are an important part of the IFC's and DBSA's approach to requirements related to community engagement by proponents, under the policy and performance standards on social and environmental sustainability. Where it is anticipated that a new project will involve ongoing risk and adverse impacts on surrounding communities, the Proponent will be required to establish a grievance mechanism to receive and facilitate resolution of the affected communities' concerns and complaints about the client's environmental and social performance[1]. The grievance mechanism should be scaled to risks and adverse impacts resulting from the project, must address concerns promptly, use an understandable and transparent process that is culturally-appropriate and readily accessible to all segments of the affected communities, and do so at no cost to communities and without retribution. The mechanism should not impede access to judicial and administrative remedies. The client will inform the affected communities about the mechanism in the course of its community engagement process (PS 1, Paragraph 23).

A grievance mechanism should be able to deal with most of the community issues that are covered by the IFC's performance standards. Grievance mechanism requirements, in relation to affected communities, are explicitly stated with regard to security personnel (PS 4, Paragraph 13), land acquisition (PS 5, Paragraph 10), and adverse impacts on indigenous peoples (PS 7, Paragraph 9).

11.1 What is a grievance?

The IFC Good Practice Note defines a grievance as a concern or complaint raised by an individual or a group within communities affected by company operations or a project (see Section 11.2) (IFC, 2009). Concerns and complaints can result from either real, or perceived, impacts of a company's operations, and may be filed in the same manner, and handled in accordance with the same procedure. The difference between responses to a concern and responses to a complaint, may be in the specific approaches and the amount of time needed to resolve same. The term "grievance" implies that there may be a problem. However, in practice, the nature of feedback that communities may want to bring to a company's attention will vary, since communities often find it appropriate to use the same channels to communicate not only grievances, but also questions, requests for information, and suggestions. Communities may even use these channels to convey what they think the company is doing well.

The Proponent should bear in mind that unanswered questions or ignored requests for information have the potential to become problems and should, therefore, be addressed promptly. It is good practice to respond to community feedback through the relevant pillars of community engagement, such as disclosure, consultation, and participation in project monitoring. For example, a question about specific benefits the project provides, or intends to provide, to women in the community, can be forwarded to a community liaison person, or a staff member who specifically deals with gender matters, if such person has been appointed by the project. The person(s) who asked this question are then notified as to who will respond, and by when.

11.2 Project-level grievance mechanism

The IFC Good Practice Note (IFC, 2009) defines a project-level grievance mechanism for affected communities as a process for receiving, evaluating, and addressing project-related grievances from affected communities, at the level of the company, or project. In the context of this project, this mechanism may also address grievances against contractors and sub-contractors. Project-level grievance mechanisms offer companies and affected communities an alternative to external dispute resolution processes (legal or administrative systems, or other public or civic mechanisms). These grievance mechanisms differ from other forms of dispute resolution in that they offer the advantage of a locally-based, simplified, and mutually-beneficial way to settle issues within the framework of the company–community relationship, while

[1] For ANNA Project in Angola - RNT

recognising the right of complainants to take their grievances to a formal dispute body or to other external dispute-resolution mechanisms.

However, it should be noted that complex issues that arise from high environmental and social impacts, are seldom resolved in a relatively simple way. In such cases, projects should anticipate involvement of various third parties in the resolution process to achieve solutions with affected communities. These include, but are not limited to, various national and international mediation bodies, independent mediators and facilitators with sector and country-specific expertise, and independent accountability mechanisms of public sector financiers.

11.3 Approach to grievance redress

The IFC Good Practice Note (IFC, 2009) sets out a step-by-step process for handling grievances, as well as assigned responsibilities for their proper completion. Companies establishing grievance mechanisms will follow the process steps discussed in this section.

11.3.1 *Step 1: Publicising grievance management procedures*

When and how the grievance mechanism is introduced to affected communities, can have significant implications for its effectiveness over time. Guiding principles for publicising a grievance mechanism, should be in line with cultural characteristics and accessibility factors of affected communities. The information should include at least the following:

- The project-level mechanisms that are (and are not) capable of delivering solutions, and what benefits complainants can receive from using the company grievance mechanism, as opposed to other resolution mechanisms;
- Who can raise complaints (affected communities);
- Where, when, and how community members can file complaints;
- Who is responsible for receiving and responding to complaints, and any external parties that may receive complaints from communities;
- What sort of response complainants can expect from the company, including timing of response; and
- What other rights and protection are guaranteed. Ideally, as part of their first interactions with company representatives, communities should be informed of a company's intention to establish a grievance mechanism, and should continue to be reminded of this mechanism on a regular basis during project implementation. Companies should emphasise the objectives of the grievance system and the issues it is designed to address. A company's community liaison officers, grievance officers, or individuals working in similar positions, should be responsible for publicising the procedure through appropriate methods.

11.3.2 *Step 2: Receiving and keeping track of grievances*

Once communities are aware of the mechanism and start to access it to raise grievances, the company needs to process grievances raised. Processing includes:

- Collecting grievances;
- Recording grievances as they are received;
- Registering them in a central location; and
- Tracking them throughout the processing cycle to reflect their status and other important details.

Receiving concerns and complaints

Below are simple rules that any receipt procedure for grievances should follow:

- All incoming grievances should be acknowledged as soon as possible. A formal confirmation, with a complaint number, or other identifier, and a timeline for response, assures the complainant that the organisation is responding properly, and it provides the project with a record of the allegation. If a complaint is received in person, good practice is to acknowledge it on the spot;

- If a more complex investigation is required, the complainant should receive an update explaining the actions required to resolve the complaint, and the likely timeline; and
- The company should explain upfront which claims are clearly outside the scope of the mechanism and what alternative avenues communities can use to address these potential issues.

11.3.3 *Step 3: Reviewing and investigating grievances*

For a grievance mechanism to work, all complaints should be handled as promptly as possible, depending on the nature and complexity of the matter. The central unit, or person responsible for grievance handling, should organise the process to validate the complaint's legitimacy and to arrange for the investigation of details. Depending on the circumstances of the complaint, various units or departments may need to get involved, including senior management, if such a person's direction and decision is required by the established procedures and division of responsibilities. To begin this process, the nature of the grievance must be established to determine the measures needed for review and investigation. All grievances will need to undergo some degree of review and investigation, depending on the type of grievance and clarity of circumstances. For example: minor, straightforward issues may only need screening before proceeding to the next step (resolution options and response). Review of minor issues, especially those related to a complainant's request for information, can generally be handled easily by providing information on the spot, or referring the person to community liaison personnel. If there is any possibility that deeper underlying issues may exist, the complaint must be investigated further.

Less clear, more problematic, or repetitive issues, or group complaints, may need a more detailed review prior to action. Staff involved in handling grievances may need to seek advice internally and, in some cases, turn to outside parties to help in the validation process, especially in cases of damage claims. One option to help determine legitimacy, is an internal committee comprising staff who will be involved in the operation, staff who will be involved in the supervision of the grievance mechanism, and managers from the project departments whose activities are likely to result in claims. For example, the committee might consist of RTT members, a community liaison officer and an operations manager. This committee can also provide initial recommendations on resolution options.

Where an extensive investigation is required

An extensive investigation may be required when grievances are complex or widespread and cannot be resolved quickly. As a way to conform to the principle of "no cost to communities," the company should take full responsibility for investigating the details of grievances channelled through its grievance mechanism. However, in cases of sensitive grievances such as those involving multiple interests and a large number of affected people, it may help to engage outside organisations in a joint investigation, or allow for participation by the RTT, civil society organisations, NGOs, or local authorities, if the complainants agree to this approach.

11.3.4 *Step 4: Developing resolution options and preparing a response*

Once the grievance is well understood, resolution options can be developed taking into consideration community preferences, project policy, experience, current issues and potential outcomes. The following approach is proposed (World Bank, n.d.):

- A risk-based assessment of potential grievances, disputes or conflicts that may arise during project preparation and implementation;
- Identification of the client's existing capacity for grievance redress; and
- An action plan that identifies priority areas for strengthening grievance capacity or, if necessary, establishing new mechanisms at the project level. Where applicable, dedicated resources should be allocated for realisation of the action plan.

Developing resolution options commensurate with the nature of the grievance

General approaches to grievance resolution may include proposing a solution:

- Unilaterally (the company proposes a solution);
- Bilaterally (the company and the complainant reach a resolution through discussion or negotiation);
- Through a third party (either informally or formally through mediation); or
- Through the RTT, traditional and customary practices.

One of the potential advantages of a grievance mechanism is its flexibility. Rather than prescribe a specific procedure for each complaint, it may be helpful to establish a "menu" of possible options appropriate for different types of grievances, so that company personnel and community members have models for action when a dispute arises. Options include altering or halting harmful activities, or restricting their timing and scope, providing monetary compensation, an apology, replacing lost property, revising community engagement strategy, and renegotiating existing commitments or resettlement plans.

Preparing and communicating a clear response

Regardless of the outcome, a response should be provided to all complainants. Responses can be either oral or written, depending on whether the grievance was received orally or in writing. At the time of first interaction between the company representative and complainant(s), there are two possible scenarios:

1. The claim is rejected, and no further action will be taken. If a claim is rejected upfront, it is either ineligible or clearly does not have a basis. If the response is that the grievance does not require action by the company to resolve it, all considerations should be documented and included in both the response and the company systems for grievance tracking and for further reference. Companies should be diplomatic when telling community members that no further action will be taken, since they are likely to be disappointed, but if a detailed and respectful explanation, together with compelling evidence of why it cannot be accepted, is included, this usually keeps a conflict from escalating.

If the claim is accepted, the response procedure would include two general steps:

1. A preliminary response should be provided within a stipulated period of time and should propose the next steps and actions to be taken for resolution. The complainants must be informed of the results of the assessment and the status of their claims, and further discussion encouraged and invited with complainants (to obtain additional arguments, collect more evidence, conduct further investigation, and launch a dialogue). If complainants are not likely to be satisfied with the outcome that the company is considering, group or individual meetings, as needed, should be scheduled to discuss the findings and to further clarify the position of the company and of the complainants. In more complex cases, management should participate in such meetings, since they are perceived to be the legitimate decision-makers. In this project, it will be advisable that the RTT is given space to deal with grievances from project-affected people, as well as from communities and third parties.
2. A final response should be provided to document the final proposed resolution. The proposal must be communicated, and mutual commitments stipulated, and the complainants' agreement must be ensured. If the complainants are not satisfied with the proposed resolution, or the outcome of the agreed corrective actions, they should be free to take their grievances to a dispute resolution mechanism outside of the company grievance mechanism.

Close out cases only when an agreement with complainants is reached

Following completion of the agreed-upon corrective actions, it is a good practice to collect proof that those actions have taken place. For example:

- Take photos, or collect other documentary evidence, to form a comprehensive record of the grievance and how it was resolved;
- Create a record of resolution internally, with the date and time it took place, and have responsible staff sign it off;

- Hold a meeting with the complainants to get a collective agreement to close out the claim; and
- If the issue was resolved to the satisfaction of the complainants, obtain a confirmation and file it along with the case documentation.

11.3.5 *Step 5: Monitoring, reporting, and evaluating a grievance mechanism*

Monitoring and reporting can be tools for measuring the effectiveness of the grievance mechanism and the efficient use of resources, and for determining broad trends and recurring problems so they may be resolved proactively before they become points of contention. Monitoring helps identify common or recurrent claims that may require structural solutions or a policy change, and it enables the company to capture any lessons learned in addressing grievances. Monitoring and reporting also create a base level of information that can be used by the company to report back to communities. Although internal monitoring is usually sufficient for smaller projects, in the case of projects with significant impacts, or where the facts surrounding the grievance are contentious, monitoring by a neutral third party can enhance the credibility of the grievance mechanism.

Tracking grievance statistics to ascertain effectiveness

Depending on the extent of project impacts and the volume of grievances, monitoring measures can be as simple as tracking the number of grievances received and resolved, or as complex as involving independent third-party evaluations. Apart from reviewing each grievance and analysing effectiveness and efficiency, companies can also use complaints to analyse systemic deficiencies. Grievance records should provide the background information for regular monitoring, both informal and formal. Therefore, even a simple tracking system should provide an opportunity to aggregate information and recognise patterns in the grievances the company receives, and how they are being resolved.

Adapting the mechanism to correct effectiveness

The final objective of monitoring is to ensure that the design and implementation of the grievance mechanism adequately respond to the stakeholders' needs in a cost-effective manner.

To maintain the mechanism's effectiveness, the company must design the mechanism and assign responsibilities to allow for policies and practices to improve efficiencies in the receipt and resolution of grievances. These objectives can be met only through ongoing adjustments to the mechanism, facilitated by support from management. For example:

- If communities strongly prefer one of several channels offered, through which to submit grievances, company resources should focus on that channel to lower the costs of methods that communities do not use;
- If only one sub-group in the community raises complaints (for example women and the elderly), determine whether this phenomenon is the result of a particularly high impact of operations on that specific group, or an accessibility issue;
- If a large number of grievances are not resolved through the mechanism, a major change may be required in how the company approaches resolution, rather than focussing efforts on resolving individual issues; and
- If the grievances allege that the mechanism lacks transparency, adjust the policy and methods used to publicise it, place more emphasis on inviting the community to participate in decision-making through the grievance mechanism, and consider involving third parties.

Using monitoring results to report back

Lessons learned throughout the process of handling grievances can help ensure continual improvement of the company's operations. The company can also use monitoring to report back to the community on its implementation of the mechanism. In addition, the company can designate personnel responsible for translating lessons learned from its monitoring into concrete policy and practice changes for the company. A community meeting, to explain the results of such reports, is also effective, and may lead to a mutually-respectful relationship between the company and the community.

11.4 Resources needed to manage a grievance mechanism

11.4.1 *Resources for grievance mechanisms*

Grievance mechanisms will be effective if adequate resources (people, systems and processes) and associated financial resources are assigned to implementation, and if responsibilities are clearly defined. Grievance management should be recognised as a business function with clearly-defined objectives, assigned responsibilities, timelines, budget, senior management oversight, and regular reporting. For these reasons, grievance mechanisms should be placed within a larger context of a social and environmental management system, and should serve as one of the indicators of whether the system is functioning properly. The ultimate responsibility for designing, implementing, and monitoring project-level grievance mechanisms, should lie with senior management.

11.4.2 *Who should be responsible for implementation?*

For a grievance mechanism to function effectively, it is important to determine a governance structure and to assign responsibilities for the mechanism's implementation. The following basic preparations should be taken into account when evaluating resources and when allocating responsibilities for grievance mechanism implementation:

- Make sure that the role of senior management is clear, i.e. in which cases, and at what stage in the handling of a complaint, their decision will be required, and who will be responsible for strategic oversight of grievance management. Senior management has final authority to ensure that commitments to affected communities are met, and clear reporting lines must be established between senior management and those implementing the grievance mechanism.
- Identify personnel, or a unit, responsible for administering the grievance mechanism (recording complaints, arranging for collection of additional information, consulting relevant departments or persons within the organisation, tracking progress, aggregating and forwarding feedback to complainants, reporting). It may be a new or existing unit or person within an organisation. Who is best suited to handle these tasks, is sometimes determined by the nature of community grievances. The RTT, together with community liaison or an administrative assistant, should serve as an entry point to receive and log complaints. Frequent turnover of staff assigned to grievance handling and community liaison, can adversely impact the perception of the mechanism.
- It should be noted that other community engagement tasks do not take the place of handling grievances, particularly if a community liaison officer is also assigned to handle the grievance process.
- Where possible, functions of grievances handling should be separated from project management, and assign clear accountability for each, to avoid decisions that favour the interest of the company only. Safeguards can include clearly defining the authority and decision-making responsibilities of people involved in administering the grievance mechanism, as well as making sure that senior management is ready to intervene. These would include responsibilities for managing the overall process, as well as separate steps (receipt, recording and tracking, investigating, and responding).

11.4.3 *Involving third parties*

Third parties such as non-governmental organisations, community-based organisations, local governments, local community and religious organisations and traditional councils, can sometimes be involved in companies' grievance mechanisms. They can serve as process organisers, places to bring a complaint to be passed on to the company, or as facilitators, witnesses, advisors, or mediators. In some cases, it may be beneficial to place part of the responsibility for the process on external entities, formed within the communities themselves, or acceptable to them, while the company maintains ultimate responsibility and accountability for the process. Third parties can help increase the level of trust from communities, as well as overcome certain limitations of project-level mechanisms, such as lack of transparency, insufficient company resources, possible conflicts of interest, and biases, provided that they themselves are perceived to be unbiased and impartial relative to both the company and the communities.

Options for third party engagement

To have an effective project-level grievance mechanism, companies need to understand the roles of third parties before engaging them. For example:

- *Community self-governance structures (such as village councils, tribal councils).* These should be considered when developing a grievance mechanism to ensure cultural appropriateness, community involvement in decision-making, and efficient and effective use of existing community resources;
- *Local NGOs, CBOs.* Identify those that are active in the area of project or company operations, learn about their interactions with the affected communities, determine what contribution they can make to effective resolution, and discuss options for an NGO to administer the project's grievance mechanism, or part thereof. Sometimes NGOs can also represent local communities and help them build their capacity to understand the process and its benefits, participate in decision-making, and articulate grievances and bring them to the attention of companies. Such organisations can be viewed as a voice of communities, and companies should be prepared to deal with grievances brought by NGOs on behalf of communities; and
- *Local government authorities*. Communities sometimes bring their project-related complaints to local governments. It would be advisable for the company to consider partnering with local authorities to facilitate receipt of grievances from communities. Local governments can also be a resource to help companies resolve complaints, since local authorities may have an established relationship with the communities. They can participate as third parties and advisors in company-initiated resolution processes.

11.5 Grievance mechanisms needed for projects implemented by contractors

Although a company generally differentiates between the actions of its own employees and those of contractors and sub-contractors, local communities tend to see no difference, and will attribute actions of contractors and sub-contractors to the company. This is the case even if contractors are in the area only for a short period of time.

Companies need to anticipate grievances that may arise from the actions of suppliers or contractors, and implement management tools and a policy, such as regular monitoring to govern their behaviour and actions, including provisions for co-ordinated management of grievances, and key indicators that help evaluate the effectiveness of contractors' policies and tools. Where there are a small number of contractors, it may be feasible for the contractors to establish and manage their own grievance mechanisms. Companies will need to make sure that these mechanisms do not conflict with the proponent's mechanism or those of the other contractors, by establishing clear guidelines and ensuring oversight. Where contractual relationships are more complex or numerous, companies may wish to have all grievances directed to the company's mechanism, regardless of whether they relate to the company or to its contractors or sub-contractors.

12 Framework for monitoring, evaluation and reporting

The RPF monitoring, evaluation and reporting framework is aimed at measuring the following main indicators:

- Impacts on affected individuals, households and communities are to be maintained at their pre-project standard of living, or better;
- Improvement of communities affected by the project; and
- Management of disputes or conflicts.

Monitoring, evaluation and reporting of the resettlement must be carried out during the whole process of land acquisition and compensation, to ensure that the objectives are met, and that successful implementation of the resettlement occurs. The monitoring must be carried out by both internal and external monitors, to be appointed by RNT, SAPP and DBSA. The monitors must work together with the established RTT for inclusive and meaningful monitoring evaluation and reporting. The monitoring process must ensure that all responsible implementing agencies follow the schedule and comply with the principles of the RPF.

Suggested monitoring indicators are outlined below, and include, but are not limited to:

- Number and location of public consultation meetings held with PAPs and local authorities during resettlement implementation;
- Number of PAPs effectively compensated, and aggregated amount disbursed for compensation (actual versus planned); and
- Number of complaints relevant to resettlement: total received, total justified and total unjustified.

Table 12.1 below provides a typical plan for monitoring, evaluating and reporting that may be followed or adapted, as may be deemed necessary.

Table 12.1: Plan for monitoring, evaluating and reporting

Item	Main activities	Responsible institute	Frequency of monitoring
Public consultation	Consultation meeting with the PAPs	RTT and PIA	Continuous
Database	Updating census results	PIA in consultation with RTT	Once during RAP implementation
Disclosure of entitlement	Display results of the census to PAPs	PIA in consultation with RTT	Twice
Preparation of alternatives	Follow-up of implementation of proposed alternatives	PIA in consultation with RTT	Twice
Compensation and other resettlement measures	Follow up compensation process	PIA in consultation with RTT	Continuous
Follow up of PAPs	Follow-up and monitoring of PAPs' livelihoods	PIA in consultation with RTT	Once fortnightly

12.1 Internal and external monitoring

There will be a need to carry out both internal and external monitoring to ensure complete and objective information, and to avoid biasness.

12.1.1 *Internal monitoring*

For internal monitoring, the resettlement offices of the PIA, in partnership with the project proponent, will take full responsibility for conducting regular internal monitoring of the implementation of the project. This will be done hand-in-hand with the RTT and the local authorities, and will be done at six week intervals. Post-resettlement monitoring will be undertaken internally, every three months.

The RIT will maintain, together with local officials, basic information on all physical or economic displacement arising from the project. This includes an update, for example on a quarterly basis, of the following:

- Number of households and individuals physically or economically displaced by the project;
- Length of time from sub-project identification to payment of compensation to PAPs;
- Timing of compensation in relation to commencement of physical works;
- Amount of compensation paid to each PAP household (if in cash), or the nature of compensation (if in kind);
- Number of people raising grievances in relation to the project; and
- Number of unresolved grievances specific to the resettlement process.

The PIA will review these statistics to determine whether the RAP implementation arrangements, as defined in this RPF, are effective in addressing resettlement-related issues. Financial records will be maintained by the sub-project management and the PIA, to determine the final cost of the RAP implementation.

12.1.2 *External monitoring*

External monitoring will be undertaken by an independent agency or consultant, to be appointed by RNT, SAPP and DBSA. This person/organisation will have extensive experience in social surveys and resettlement monitoring. External monitoring will be undertaken at least two years after completion of the construction phase.

External monitoring will include an independent impact evaluation that will determine:

- Whether compensation payments have been completed in a satisfactory manner; and
- Whether there are improvements in the livelihoods and well-being of PAPs.

12.2 Monitoring measures

In addition to inspecting that the consulting and construction firms are adhering to the required measures, the monitoring system will be put in place to report on the effectiveness of compensation payments and resettlement assistance. Monitoring measures must be designed to ensure the effective and timely implementation of compensation and resettlement activities. This should include the physical progress of resettlement, the disbursement of compensation, the effectiveness of public consultation and participation activities, and the sustainability of income restoration and development efforts among affected communities.

The monitoring must include continuous resettlement tasks, especially on grievance redress handling, throughout the phase of construction works, in order to ensure timely responses to PAPs’ requirements as well as correct implementation of resettlement procedures. National level monitoring, at times, is not regularly carried out. This is sometimes due to the lack of operating budget and, in these cases and others, the project must utilise resources of utilities such as transport, to facilitate the external monitors’ performance of their duties. In addition, the project must encourage PAPs, local associations and local NGOs and CBOs, to become involved with monitoring and evaluation.

The implementation of compensation and relocation activities will need to comply with both national laws and international safeguards. Particular attention must be paid to adequacy of asset valuation mechanisms, timely compensation payments, and to prior information, consultation and participation of project-affected people. The enforcement of the existing laws is also of critical importance to ensure harmonisation between the national frameworks and the international safeguards. A further issue is the eligibility status of unregistered land users, where IFC guidelines will need to be applied, and all affected land users fully compensated.

12.3 Indicators

This RPF highlights the objectively verifiable indicators (OVIs) which can be used to monitor the impacts of the compensation and resettlement activities. These indicators will be targeted at quantitatively measuring the physical and socio-economic status of the PAPs, to determine and guide improvement in their social well-being. Therefore, monitoring indicators to be used for the RAP will have to be developed to respond to specific site conditions. Table 12.2 below provides a set of indicators which may be used.

Table 12.2: Types of verifiable indicators

Monitoring	Evaluation
Outstanding compensation, or resettlement contracts not completed, prior to the following agricultural season.	Outstanding individual compensation, or resettlement contracts.
Communities unable to set village-level compensation after two years.	Outstanding village compensation contracts.
Grievances recognised as legitimate out of all complaints lodged.	All legitimate grievances rectified.
Pre-project production and income (year before land used) versus present production and income of those resettled.	Affected individuals and/or households compensated or resettled in first year who have maintained their previous standard of living at final evaluation.
Pre-project production versus present production (crop for crop, land for land).	Equal, or improved, production per household.

12.3.1 *Indicators to determine status of affected people*

A number of indicators should be used in order to determine the status of affected people (land being used compared to before, standard of house compared to before, level of participation in project activities compared to before, how many kids in school compared to before, health standards, etc.). Therefore, the resettlement and compensation plans prepared as part of the RAP will set two major socio-economic goals by which to evaluate its success:

- Affected individuals, households, and communities are able to maintain their pre-project standard of living, and possibly improve on it; and
- The local communities remain supportive of the project.

12.3.2 *Indicators to measure RAP performances*

As documented in the RPF, in order to access whether these goals are met, the resettlement and compensation plans will indicate parameters to be monitored, will institute monitoring milestones and will provide resources necessary to carry out the monitoring activities. For example, the following parameters and verifiable indicators can be used to measure the resettlement and compensation plan’s performance:

- Questionnaire data will be entered into a database for comparative analysis at all levels of territorial and governmental authority;
- Each individual will have a compensation dossier recording his or her initial situation, all subsequent project use of assets/improvements, and compensation agreed upon and received;
- The local authority will maintain a complete database on every individual impacted by the project, land use requirements including relocation/resettlement, and compensation, land impacts or damages;
- Percentage of individuals selecting cash, or a combination of cash and in-kind compensation;
- Proposed use of payments;
- The number of contentious cases out of the total cases;
- The number of grievances, and time and quality of resolution;
- Ability of individuals and families to re-establish their pre-displacement activities, land and crops, or other alternative incomes;
- Agricultural productivity of new lands;
- Number of impacted locals employed by the civil works contractors;

- Seasonal, or inter-annual fluctuation, of key foodstuffs; and
- General relationships between the project and the local communities.

12.3.3 *Indicators to monitor and evaluate the implementation of RAPs*

The RPF indicates that financial records must be maintained by the PIA to permit calculation of the final cost of resettlement and compensation, per individual or household. Every individual receiving compensation will have a dossier containing:

- Individual bio-data information;
- Number of people he/she claims as household dependents; and
- Amount of land available to the individual, or household, when the dossier was opened.

The following additional information will be acquired for individuals eligible for resettlement/compensation:

- Type and amount of compensation;
- Level of income and of production; and
- Inventory of material assets and improvements in land.

12.4 RAP monitoring plan

The IFC recommends that the RAP must provide a coherent monitoring plan that identifies the organisational responsibilities, the methodology, and the schedule for monitoring and reporting. The three components of a monitoring plan should be performance monitoring, impact monitoring and a completion audit.

12.4.1 *Performance monitoring*

In accordance with IFC guidelines (IFC, 2002), performance monitoring is an internal management function allowing the sponsor, or the organisations responsible for resettlement, to measure physical progress against milestones established in the RAP. Examples of performance milestones could include:

- Public meetings held;
- Census, assets inventories, assessments, and socio-economic studies completed;
- Grievance redress procedures in place and functioning;
- Compensation payments disbursed;
- Housing lots allocated;
- Housing and related infrastructure completed;
- Relocation of people completed;
- Income restoration and development activities initiated; and
- Monitoring and evaluation reports submitted

12.4.2 *Impact monitoring*

Impact monitoring measures the effectiveness of the RAP and its implementation in meeting the needs of the affected population. Impact monitoring must be conducted by an independent external agency appointed by the Proponent. IFC highlights the purpose of impact monitoring as being to provide the Proponent, or resettlement implementation agent, with an assessment of the effects of resettlement, to verify internal performance monitoring and to identify adjustments in the implementation of the RAP, as required. It is recommended that, where feasible, affected people should be included in all phases of impact monitoring, including the identification and measurement of baseline indicators.

12.4.3 *Completion audit*

This should be undertaken by an independent third party to assess whether the outcome of the RAP complies with IFC Involuntary Resettlement Policy guidelines (2002). The key objective of this external evaluation will be to determine whether the Proponent's efforts to restore the living standards of the affected population, have been properly conceived and executed. IFC guidelines indicate that the audit should verify that all physical inputs committed to in the RAP, have been delivered, and that all services have been provided. In addition, the audit should evaluate whether the mitigation actions prescribed in the RAP have had the desired effect. The socio-economic status of the affected population, including the host population, should be measured against the baseline conditions of the population before displacement, as established through the census and socio-economic studies.

12.4.4 *Socio-economic assessment*

The purpose of a socio-economic assessment, which is part of the evaluation process, is to ensure that PAPs' livelihood and well-being have improved, and have not worsened, as a result of the project. An assessment will be undertaken on payment of compensation, restoration of income and livelihoods, and provision of sufficient community development activities. Monitoring of living standards will continue after resettlement. Additionally, a reasonable period (usually two years) must be established for monitoring post-resettlement impacts. A number of indicators (discussed in Section 0) will be used for measuring the status of affected people.

Finally, the socio-economic assessments will use surveys, focus-group meetings and participatory appraisal tools, for measuring impacts. Additionally, since a baseline household survey will have been completed during the RAP preparation, the assessment will measure changes based on this baseline.

13 Conclusion and recommendations

Since one of the objectives of the ANNA Project in Angola is to promote sustainable development through the creation of job opportunities and growth of the economy, it will be important that the sustainable livelihoods of affected communities are afforded high priority. The Proponent and the contractors need to give attention to households affected by the project, in terms of employment, skills development and economic improvement, during the implementation of the project.

The census, socio-economic, asset and infrastructure data, of affected households that will be collected, will assist the Proponent to make informed decisions regarding the resettlement of the affected households and the relocation of their graves (if necessary). It is recommended that there is adequate consultation with the affected households during the lifetime of the project, so as to minimise discontentment and promote good relations.

In global cases, where resettlement has been successful in leaving the affected people economically better off, in a socially stable condition, and in a manner that they are themselves able to sustain over time, the process has been characterised by a number of best practices and enabling factors, such as:

- An appropriate understanding of the complications of resettlement;
- Proper legal and policy frameworks at a national level;
- Adequate funding;
- Sufficient capacity, including experience in working with resettlement;
- Honest consultation and negotiation with the affected people;
- Effective planning, implementation and monitoring;
- Integration of the resettlement project into its regional economic and political context;
- The necessary political will to ensure that the above enabling factors are obtained; and
- A resettlement process that is properly carried out.

International experience of many projects shows that, unless these best practice factors are achieved/included, resettlement exposes affected people to a range of risks such as:

- Landlessness;
- Homelessness;
- Joblessness;
- Economic and social marginalisation;
- Increased morbidity and mortality;
- Food insecurity;
- Loss of access to common property resources; and
- Social and cultural dislocation and distraction.

Unless consciously countered, these risks become reality, negatively reinforcing each other in an interactive and cumulative manner. On the other hand, if these risks are incorporated as part of planning and project design, and if the necessary best practice factors are obtained, these risks can be turned into development opportunities, resulting in a sustainable and responsible resettlement.

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