

## Republic of Benin

# Environmental and Social Impact Assessment for the Development and Servicing Project of the Glo-Djigbe Industrial Zone in the Municipalities of Tori-Bossito and Ze

## Final report



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# Technical data sheet







## Republic of Benin

## Environmental and Social Impact Assessment of the development and servicing Project of the Glo-Djigbe Industrial Zone in the municipalities of Tori-Bossito and Ze

## Environmental and Social Impact Assessment Report

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## Lists of abbreviations and acronyms

ABE	Benin Environment Agency
ADPG	Glo-Djigbe Perimeter Development Authority
AEP	Drinking water supply
AFC	Africa Finance Corporation
AGR	Income Generating Activity
ANAC	National Civil Aviation Agency
ANAT	National Agency for Spatial Planning
ANDF	National Estate and Land Agency
ANTEA	Antea France
APIEx	Agency for the Promotion of Investments and Exports
BAI	Office of Analysis and Investigation
CA	District Manager/Chief
CEO	Chief Executive Officer
CFD	Land and State Code
CHS	Health and Safety Committee
CIPEC	Centre for Information, Forecasting and Advice
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora (known as the Washington Convention)
CNSR	National Road Safety Centre
CNSS	National Social Security Fund
CO	Carbon monoxide
CPS	Social Promotion Center
CV	Village Chief
DAO	Tender documents
DCE	Companies' Consultation Documents

DDS-AL	Departmental Directorate of Health Atlantic Coastal
DDCVDD	Departmental Directorate for the Living Environment and Sustainable Development
DES	Environmental and Social Department
DGEFC	General Directorate of Water, Forests and Hunting
DUP	Public Utility Declaration
SESA	Strategic Environmental and Social Assessment
ECC	Environmental Conformity Certificate
ECOWAS	Economic Community of West African States
EFI	Land and property survey
ESD	Environmental and Social Department
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESU	Environmental and Social Unit
FAO	Food and Agriculture Organization of the United Nations
FCFA	CFA Franc
FG	Focus Group
GAP	Government Action Program
GHG	Greenhouse Gas
GIS	Geographic information system
GNSP	National Association of Fire Fighters
GPS	Global Positioning System
ha	hectare
HIV AIDS	/ Human immunodeficiency virus / Acquired Immunodeficiency Syndrome
HSE	Hygiene health environment
HSST	Hygiene health and safety at work
IF-AL	Forest Inspection Atlantic Coastal

IFC	International Finance Corporation
IGN	National Geographic Institute
ILO	International Labour Organization
INSAE	National Institute of Statistics and Economic Analysis
IUCN	International Union for Conservation of Nature
IZ	Industrial zone
IWRM	Integrated Water Resources Management
LPS	Land and Property Survey
LOAEL	Lowest-observed-adverse-effect level
km	kilometer
MCVDD	Ministry of the Living Environment and Sustainable Development
MDGL	Department of Decentralization and Local Governance
MDO	Millennium Development Objectives
MEF	Ministry of Economy and Finance
MPD	Ministry of Planning and Development
MTD	Sexually Transmitted Disease
MW	Megawatt
PS	Performance Standard
NGO	Non-governmental organization
OSC	Civil Society Organization
PAP	Persons Affected by the Project
RAP	Resettlement Action Plan
PCB	Polychlorinated biphenyl
PDC	Municipal Development Plan
GDP	Gross Domestic Product
PMH	Human Motricity Pump

POP	Persistent Organic Pollutants
PPE	Personal Protective Equipment
PSH	Person with a disability
PV	Minutes
PWD	Persons with physical or mental disabilities
RGPH	General Census of Population and Housing
RGPH-4	4 <sup>th</sup> General Census of Population and Housing
RNIE	Interstate highway
RSE	Social and environmental responsibility
SDAT	Regional Development Master Plan
SDO	Sustainable Development Objectives
SEP	Stakeholder Engagement Plan
SEZ	Special economic zone
SBEE	Benin Electric Energy Company
SONEB	National Water Company of Benin
SRC	Community Relations Service
SSC	Collective Services Schemes
STAD	Territorial Plan for Planning and Development
ToR	Terms of Reference
TF	Land title
TPI	Court of first instance
UEMOA	West African Economic and Monetary Union
WMP	Waste Management Plan
WHO	World Health Organization
ZAD	Deferred development zone
ZU	Area to urbanize





# Non-Technical Summary

## 1. Introduction

### 1.1. Background

ARISE Integrated Industrial Platform (**ARISE**) has entered into a partnership with the Republic of Benin to develop the of Glo-Djigbe Industrial Zone in Benin (hereafter referred to as '**the Project**' or '**Glo-Djigbe IZ**' or '**GDIZ**'). ARISE and the Republic of Benin formed a joint venture, the Société d'Investissement et de Promotion de l'Industrie Benin (**SIPI Benin**), that will be in charge of managing GDIZ.

ARISE contracted the international environmental consultancy firm *Antea France* to conduct the Environmental Impact Assessment (EIA) for the Project in line with national regulatory requirements for local permitting purposes. This national EIA was conducted between Octobre 2019 and February 2020 and approved by the Benin Environmental Agency on the 5<sup>th</sup> of April 2020 with the issuance of the "*Certificat de conformité environnementale*" or Environmental Compliance Certificate.

In August 2020, ARISE contracted Antea France to perform the Environmental and Social Impact Assessment (**ESIA**) for the Project complying with the International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability.

In parallel, ARISE contracted INSUCO to perform the Resettlement Action Plan (RAP) in coordination with the Government of Benin for the purpose of acquiring land rights on the Project site and offering fair and adequate compensation to physically and economically displaced persons.

The present document constitutes a Non-Technical Summary (**NTS**) of the Draft Final version of the ESIA issued on 15<sup>th</sup> September 2020.

### 1.2. Purpose of the document

The purpose of an ESIA is to identify the potential positive and negative environmental and social impacts that may stem from the Project, to determine the adequate measures to be implemented in order to manage, mitigate, enhance and monitor those impacts, and to assess the net impact following the application of mitigation measures.

The objective of the present document is to provide a shortened and simplified version of the ESIA accessible to all Project stakeholders. This document is available in English and French language and is disclosed on GDIZ's web site ([www.GDIZ-Benin.com](http://www.GDIZ-Benin.com)).

The document briefly presents the Project, its key environmental and social impacts and planned mitigation and improvement measures, as well as the proposed arrangements for stakeholder engagement and management of grievances during the construction and operation of the new industrial zone.

## 2. Summary description of the Project

### 2.1. Project location

GDIZ will be located close to the future international airport of Cotonou, about 40 km north of Cotonou city centre, as shown on the Project location map below.

It will be positioned on the territory of 2 municipalities, Tori-Bossito and Ze which are both attached to the Atlantic Department. There are 8 villages which are the closest to the Project site:

- Agbodjedo, Anavie, Djitin-Aga and Houeze in the municipality of Ze;
- Dokanme Gbetaga, Sogbe and Zebe in the municipality of Tori-Bossito.



Figure 1: Location of the Project area

## 2.2. Project components

GDIZ's purpose is to develop an integrated industrial park offering 560 plots of different sizes based on the best understanding of the demand and is serviced with all necessary utilities (water, electricity, sewage, etc.) and advantageous economic and financial conditions so that private companies will establish themselves in the industrial zone once it is operational. It targets agro-industrial units in the sectors of cashew nut and cotton industrial processing (including the manufacture of clothing) but is also open to other sectors such as pineapple, vegetable processing, building materials, consumer goods, etc.

The Project area is 1,640 ha. However, the proposed development covers an area of 1,462 ha along with balance land being consumed under the public road as well as valley area. It will be developed according to a master plan whose main features are visible on the plan below. Land uses will be divided between industrial, commercial, warehouse, container yard, cotton bales storage, parking, facilities, residential and green areas.

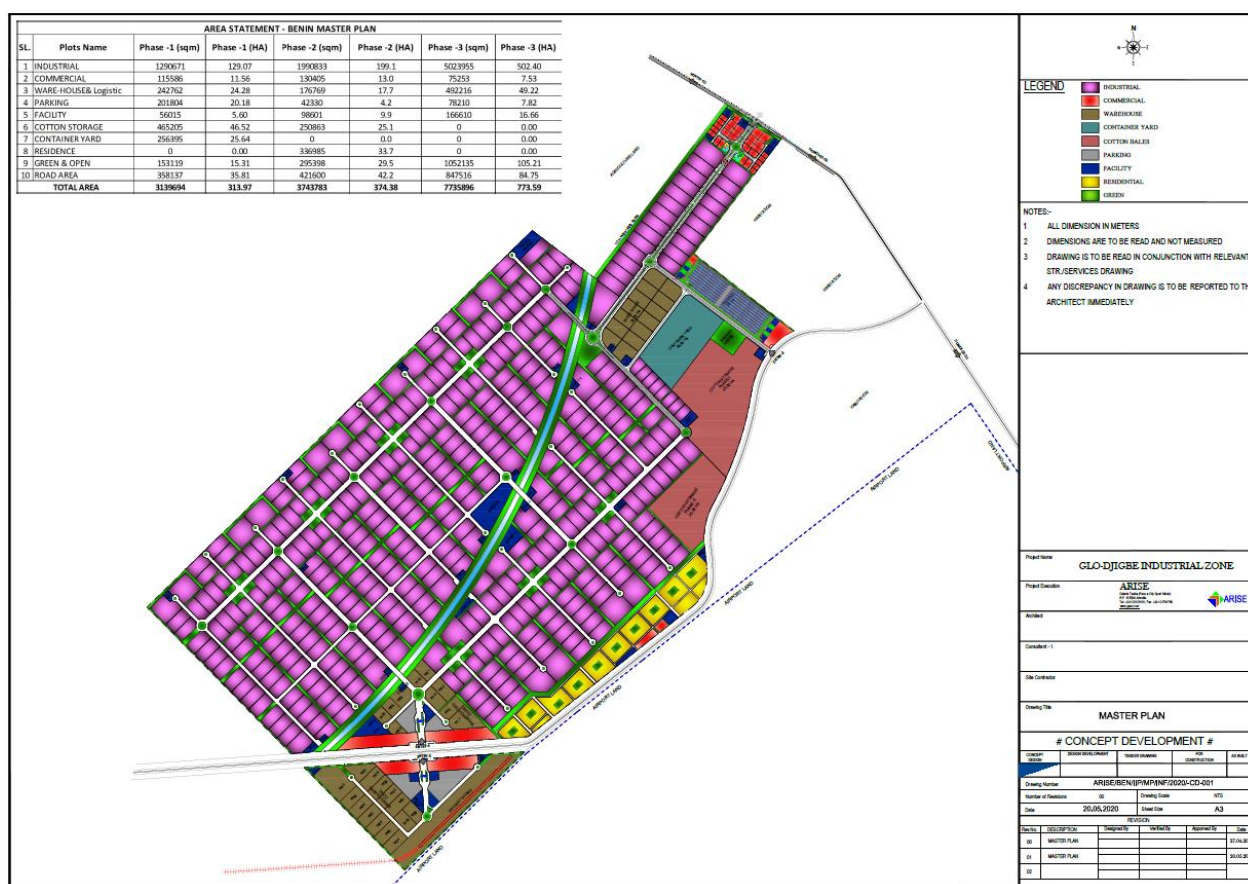


Figure 2 : GDIZ master plan

The Project will be developed in 3 phases spread over 8 years, as shown on the map below.

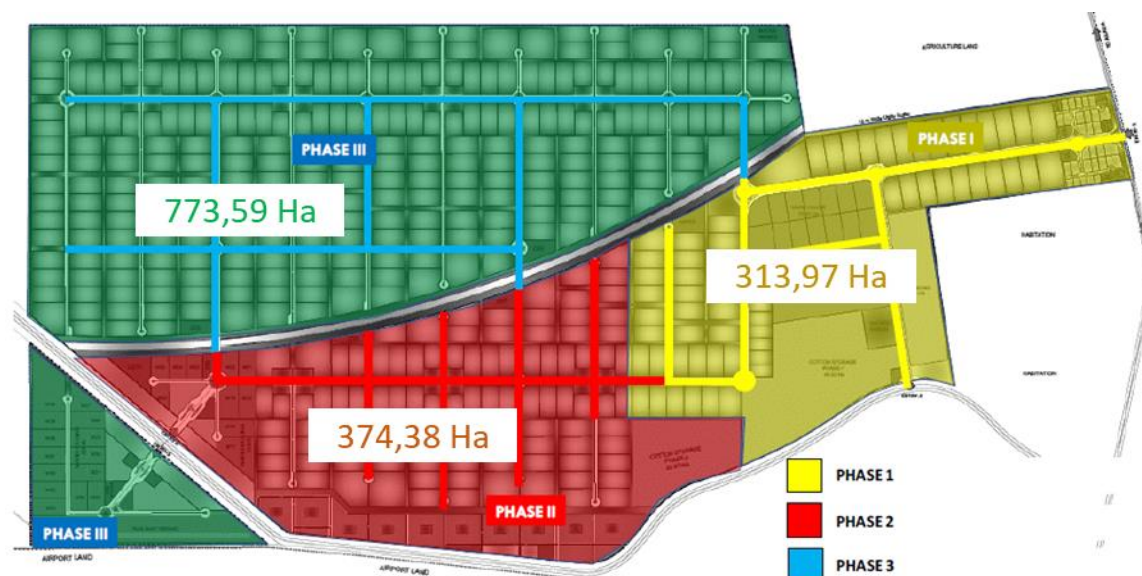


Figure 3 : Phased development of the Project



GDIZ includes different types of utilities and administrative buildings to offer a variety of services to businesses and industries:

- **Shared utilities:** electricity supply and distribution system, water management system covering water supply, wastewater and stormwater management and solid waste management system.
- **Common administrative buildings:** single-window clearance (SWC), police station, fire station and custom gate.
- **Green areas** covering 150 ha.
- **Logistical infrastructure:** 44 km of proposed new road construction, parkings and container yards.

The Project site will be secured by a chain link fence lined with a shrub fence.

The construction of the GDIZ is part of a larger development plan for the north-western area of Cotonou planned by the Government. This plan also includes the construction of a special economic zone (the Glo-Djigbe SEZ) and an international airport (the Glo-Djigbe International Airport).

## **2.3. Project activities**

### **2.3.1. Construction phase**

Construction will be undertaken in phases and Project proponent will ensure:

- Authorisation for construction.
- Access to the land in phases with assurance on the inventory of the Project affected Persons, RAP and compensation in place as per planned access to the Site.
- An IFC-Standard compliant ESIA Report and its disclosure.

Land clearing, excavation and earthworks will be conducted only on the area of proposed construction and in phases. For e.g., only 20 ha of land will be targeted for development in the first 6 months and subsequently the development will be extended to the areas as needed to facilitate the investors interested in the zone. There is technically no earthwork required in the Project except focused excavations required for the construction of the roads or the buildings. Moreover, the cut-fill requirement of the construction shall be locally balanced. Only the width of the proposed roads will be asphalted. The other infrastructure like drainage system, sewage system, water supply network, electrical networks shall be constructed also in phases as per the development plan. The proposed facility buildings and structures like water tank, sub-stations, etc. shall be constructed in the early Phase-1 stage to ensure the proper functioning of the proposed development. The cement will be supplied by an external contractor and there will be no cement plant on the site. The construction materials will come from existing and authorized quarries.

The construction contractor(s) have not been selected yet.

Construction of the Phase-1 development is expected to start in December 2020 and target completion is December 2022 which is 24 months from the date of commencement. Henceforth, the Phase-1 Project area shall be technically declared open for the operations.

Construction activities will employ an estimated 1,000 workers at peak. Workers will not be housed on site, which excludes the presence of residential living quarters and on-site recruitment. Workers will be transported by bus by their employers.

### *2.3.2. Operation phase*

The operational phase will involve the use of GDIZ shared utilities (energy, water, waste) and common infrastructure as well as daily operations of the various industries which rent a plot at GDIZ. GDIZ is expected to provide a direct employment of 12,000 workers and an indirect employment of between 42 and 58,000 workers at the best of its operation. GDIZ is also planned to have a residential population of approximately 10,000 people which will be primarily working within the zone and would enjoy living in close vicinity of their workplace. The development is planned on WORK\_LIVE\_PLAY concept.

The operational phase of the zone shall witness the full exploitation of the created infrastructure and also the operation of the industries. The expected operations shall create an impact by the utilisation of the resources (energy, water, raw materials) thereby resulting in emissions as well as solid/liquid waste including noise and other atmospheric emissions which will need mitigations measures for control of the adverse impacts due to the operation of the zone.

The facility buildings, structures and the industries shall be accessible to the investors, workers and visitors within the zone, including the green and open spaces. Besides, the facility buildings like fire-station and police station shall be a great relief to the man and material within the zone by ensuring security and safety including emergency responses within the zone for its users. GDIZ and industries' personnel will have access to the dispensary and schools including other community services that will be developed along with the demand of the population in later development stages.

### **2.4. Project policy and regulatory framework**

The Project will comply with applicable environmental and social legislation in Benin and in particular with:

- Decree No. 2017-332 of 6 July 2017 on the organisation of environmental assessment procedures in the Republic of Benin.
- Act No. 98-004 of 27 January 1998 on the Labour Code.
- All sectorial decrees regulatin water, air quality, noise, waste management.

The Project will comply with ARISE ESG standards; namely the ARISE Environmental Sustainability Policy and ARISE Health and Safety Policy. These documents list the Company's commitment to managing business activities to reduce risks to the environment and communities, and the commitment to provide a healthy and safe workplace.

Furthermore, the Project will be guided by international best practices, notably:

- [IFC's Performance Standards on Environmental and Social Sustainability](#) (2012)
- World Bank Group General Environmental, Health, and Safety Guidelines (2007)

### **2.5. Scope**

The Project ESIA assesses the impacts of the GDIZ Project and covers site servicing and the construction and operation of common infrastructure that will be made available to companies wishing to locate in the Project area.

The Project proponent plans to conduct an Umbrella ESIA over the Project ESIA to mitigate the likely impact of the operating industries within the zone based on the best of understanding of the zone.

The Project ESIA does not study the impact of the activities of companies that will establish themselves in the industrial zone once it is operational. Each of these companies must therefore, in accordance with decree n°2017-332, carry out a simplified or in-depth ESIA according to the specific categorization of its project.



In addition, the industries will have to conform to the General Operational Guidelines issued by the Zone.

### 3. Potential impacts and mitigation

#### 3.1. Methodology

The environmental impact assessment was conducted by an independent team of environmental and social specialists, both Beninese and international. The impact assessment methodology involves of a systematic process derived from the approaches of the World Bank and ISO 14001.

This approach considers:

- **Impact factors** *i.e.* the activities, consumption or emissions of the Project which could be the source of impacts on the environment; and
- **Sensitive components** of physical, natural and human environments.

Identified sensitive components of the environment are as followed:

- **Physical:** climate and air quality, hydrology and hydrogeology, geology, topography and soils, landscape.
- **Natural:** protected areas, habitat and flora, fauna, ecosystem services.
- **Human:** demographic balance including migration, women and gender issues, vulnerable groups, land tenure and land use, economic activities, livelihoods and local economy (employment), habitat and settlements, health and safety, cultural heritage.

Impact analysis then determines how impact factors can affect each sensitive component of the environment in order to systematically identify the environmental and social impacts due to the Project, whether direct or indirect.

The last step is to identify the avoidance (A) and reduction (R) measures for the potential impact, and then to estimate the residual impact once these measures are taken into account. Compensation measures (C) only apply to residual impacts considered to be significant. Compensation measures (C) are implemented only if avoidance and reduction measures cannot be implemented or are deemed insufficient.

Stakeholder views, concerns and expectations relating to the Project and its impacts and potential mitigation measures, as raised during the consultation phase, are also taken into account.

The impact analysis then feeds into the development of an Environmental and Social Management Plan (ESMP). The ESMP is an operational document, which defines how mitigation measures proposed in the impact analysis will be implemented, including objectives and responsibilities for implementing the measures and procedures.

#### 3.2. Positive impacts

The Project will strongly contribute to the economic growth of Benin and create opportunities for businesses and socio-economic development in the country. Project benefits include:

- A direct foreign investment of approximately 1.5 billion USD.
- Contributing to industrial development and diversification of the national economy by offering high quality locations for the establishment of raw material companies that will process the raw material in particular the agro-commodities available within Benin.

- Increasing the attractiveness of Benin for more domestic and foreign investment leading to business creation, job and added value creation along with overall economic growth for the country.
- Increased product transformation in Benin leading to more favourable terms of exchange and increased profits made in Benin.
- Creation of employment opportunities for national workers during construction and operational phases.
- Creation of opportunities for Benin companies to provide services and supplies during construction and operation.

The Project will have a major positive impact for populations living in the vicinity of the Project site through the creation of job and economic opportunities which will increase local economic dynamism.

Approximately 1,000 jobs will be created during the construction phase for Phase 1, and the income paid to workers will be re-injected into the local economy, benefiting shopkeepers and craftsmen who themselves could capitalise on opportunities to sell products and services to site workers.

In the operational phase, approximately 12,000 direct employment and 42,000 indirect jobs could be created according to projections made by ARISE. The Project will transform the local economy by providing jobs that will reduce reliance on relatively low-income agricultural employment and will diversify the existing skills of the people.

### **3.3. Impacts on the physical environment**

#### *3.3.1. Baseline conditions*

The Project area has a relatively flat topography except for its centre, which has a slight depression. The soils are ferrallitic in nature with alluvial deposits of sand, clay and gravel along the main watercourses.

The landscape of the study area is characterized by mosaics of fields and fallow land. The landscape interest is low due to its highly anthropized / humanly modified state, as well as the absence of high points offering panoramic views or natural sites of tourist interest (lakes, waterfalls, etc.). The Project site does not have a unique or remarkable landscape character.

The average annual rainfall is about 1,200 mm and average monthly temperatures vary between 27 and 31 degrees Celsius. The average sunshine is 5.14 Kw/m<sup>2</sup>/day and winds are characterized by the occurrence of strong winds in the dry season and at the end of the rainy season towards the north-east.

The study area is characterized by low-intensity agricultural activities and limited road traffic. There are no industrial activities that could potentially degrade air quality and noise levels. Only road traffic on the interstate national road (RNIE) 2 bordering the site can be a source of both air pollution and noise pollution. Road traffic on secondary roads remains extremely low and tends to be limited to small agricultural machinery.

The hydrographic network in the study area is undeveloped since no watercourse crosses it. The central depression gathers surface runoff, specially during rainy season, but no permanent water flows exists, as reflected in the observed lack of wetland vegetation. The nearest stream, the Lama river, is about 2.5 km from the eastern boundary of the Project site and flows into the Cotonou lagoon system. The site has no permanent ponds, swamps or other natural or artificial water reservoirs, but during the rainy season one temporary pond was formed in the forest in the north eastern portion of the site.

The hydrogeological characteristics of the study area are not known, in the absence of previous studies or piezometers placed *in situ*. Groundwater mobilization is, however, effective since there are several public and private hydraulic works in the study area. The sources of surface and groundwater pollution are mainly anthropogenic, due to the use of pesticides and domestic hygiene and sanitation practices.

### 3.3.2. Key impacts

Considering the sensitivities of the physical environment, the following key potential impacts have been identified.

#### Construction phase:

- Smoke and greenhouse gases emissions from engines of construction machineries, vehicles and trucks, land clearing activities and green waste burning.
- Dust emission by earthmoving operations, storage of excavated materials and products, material crushing units and the concrete plant.
- Pollution of the superficial unconfined aquifer by wastewater and accidental spills.
- Degradation of soil quality in the event of accidental spillage of any hazardous liquid products or waste on the ground and infiltration through the ground.
- Degradation of the sound and vibration environment because of the movement and traffic of machines and vehicles.
- Soil erosion due to the site clearance and removal of vegetation.

#### Operation phase:

- Reduction of water resources available for other users due to the use of groundwater for the Project.
- Pollution of water resources in case of mismanagement of the discharges of the treatment plants and waste in the central drain.
- Visual impact with the new GDIZ area replacing the sight of crops and natural vegetation.
- Soil sealing increasing the runoff volume to be managed on-site and downstream.
- Disruption of the water management system (especially the central drainage) on site leading to changes in natural hydraulic patterns outside of the site boundaries with various environmental and health consequences.

## 3.4. Impacts on the natural environment

### 3.4.1. Baseline conditions

The study area has a sub-equatorial climate characterized by four seasons, including a major rainy season from April to July and a major dry season from December to March.

The natural vegetation in the Project area is largely anthropized and there are no longer large areas of forest with preserved natural vegetation. Shrub vegetation marks the edges of the fields with scattered larger trees. Many invasive species have colonized the area and compete with the native flora.

In some places there are still relics of degraded but recovering natural vegetation. These include open forests and semi-deciduous dense forests dominated by *Albizia zygia*. Of the 156 plant species identified, no endemic or critical habitat indicator species were observed, but eleven are protected under Benin law and two are classified as vulnerable by the global IUCN red list, *Milicia excelsa* and *Khaya senegalensis*, and one is endangered on the Benin IUCN red list, *Triplochiton scleroxylon*.

Due to permanent human occupation, there are no large natural mammals in the Project area. The mammal species that have been identified include small rodents and lagomorphs. Other species such as butterflies and insects, amphibians or terrestrial reptiles are also present, but of these, none of the species has a vulnerable status according to IUCN. National protected species are *Philantomba walteri*, *Genetta tigrine*, *Tragelaphus scriptus* and *Chlorocebus aethiops tantalus* and have been observed close to the sacred forest. One other species, *Python sebae*, was also identified.

Furthermore, several clues indicate that the site is a nesting area for several bird species. The most sensitive species are those known as ground-nesting because they are less visible. Eleven species common in Benin were observed to be nesting onsite.

#### *3.4.2.Key impacts*

Given the anthropized / humanly modified ecosystems of the Project area, impacts on natural environment, biodiversity and habitat will be limited to the following.

##### **Construction phase:**

- Destruction of habitats and associated flora, tree and herbaceous vegetation because of land clearing, felling and clearing of trees, excavations and earthworks.
- Destruction of fauna low mobile, such as juveniles and bird's eggs.

##### **Operation phase:**

- Disruptions in the water management system (especially the central drainage) on site leading to changes in the natural hydraulic patterns outside of the site boundaries and possible pollution of environment due to contaminated runoff.

### **3.5. Social impacts**

#### *3.5.1.Baseline conditions*

The Project site is surrounded by 8 villages within two different municipalities: Tori-Bossito and Ze. On the Project site itself, there are no villages but scattered buildings (approximately fifty). Fertile soils mean that almost the entire site is cultivated, supporting food and commercial production - including pineapple cultivation for export markets such as Nigeria, as well as oil palm, cassava and maize.

The land tenure situation is complex, with the coexistence of customary land law (first occupier's right) and modern land law (land title). Increasing land speculation in the area has increased tensions between these two types of legal tenure systems. The speculation has its origins in the peri-urbanisation of the area and plans for the New Cotonou (Glo-Djigbe) international airport (the development of which has not progressed), attracting urban investors to buy up land in the area.

On the same piece of land, there may therefore be an owner with a formal land title and a customary land user with customary rights to the land. Two real estate developers have also carried out land parcellation and sales operations in the Project area.

Land acquisition and compensation within the broader framework of the SEZ will be led by the Government of Benin in line with national statutory processes, with ARISE collaborating with Government to ensure that international funder requirements are met for the Project area, such as IFC Performance Standard 5 (PS5) on *Land Acquisition and Involuntary Resettlement*.

The municipalities of Tori-Bossito and Ze have 57,632 and 106,913 inhabitants respectively. The 8 villages in the study area have a population of approximately 10,639 according to the latest General Population Census and Housing of 2013 (RGPH 4, 2013).

The main socio-cultural groups are the Aïzo and Tori who cohabit with other groups such as the Fon or the Goun. Seasonally, the Peulh herders cross the study area during the great transhumance that lasts from February to May. None of these groups are recognized as indigenous by the international community or the Government.

The study area is characterised by seasonal out-migrations in the dry season when agricultural activities are at a standstill, and permanent out-migrations which has seen young people leaving their villages in search for job opportunities in urban areas or abroad. There is also a recent influx of urban land buyers motivated by land speculation.

The primary livelihood source is agriculture, involving domestic animal husbandry, hunting and rain-fed subsistence crop farming. Land is also used for commercial agriculture, centred on a few key products such as pineapples and oil palm.

Other economic activities are practiced such as nomadic livestock breeding by the Peulhs, sedentary cattle breeding by the local populations, trade and crafts in the villages market centres.

The health centres in the Project area are located in the districts of Tangbo-Djévié and Tori-Cada. The main diseases that affect populations are malaria, respiratory diseases, gastrointestinal diseases, urogenital diseases, cardiovascular diseases, dermatological diseases and sickle cell disease. The HIV/AIDS prevalence rate is 1%, with women more affected (1.3%) than men (0.8%).

Water is accessed from various sources: traditional wells, modern wells or village water supply systems. The impacted villages in the municipality of Tori suffer from poor access to water due to the breakdown of many structures.

Hygiene and sanitation practices are marked by the virtual non-existence of public and private family latrines in all the districts, with the result that the environment is polluted by faeces and unhealthy conditions. In terms of community safety, the risk of accidents comes from road traffic on RNIE 2.

### *3.5.2.Key impacts*

The Project's social impacts are more significant in comparison with its environmental impacts. Indeed, since the site is largely cultivated and surrounded by 8 villages, potential impacts on the local communities will be significant.

#### **Preparation phase:**

- Land access causing physical and economic displacement and specific impacts on women and vulnerable people.
- Loss of cultural heritage sites (vodoun sacred sites) and the Anavie sacred forest which is used by villagers to perform vodoun rites and cannot be displaced or replaced.

#### **Construction phase:**

- Various risks to workers' health and safety due to occupational and traffic accidents, spread of communicable diseases and risk of non-compliance with labour laws.
- Health and safety risks for villagers exposed to noise, dust and air quality degradation caused by passing construction site machinery and risks of communicable diseases stemming from site workers.
- Influx of workers and economic migrants affecting existing social structures in the villages.

#### Operation phase:

- Disruptions to natural hydraulic patterns due to the central drainage on site, causing water runoff outside of the site boundaries leading to crop destruction and health and sanitary issues (proliferation of mosquitoes and increased malaria risk).
- Various risks to workers' health and safety due to occupational and traffic accidents, spread of communicable diseases and risk of non-compliance with labour laws.

#### 3.6. Key impact management measures

For each impact, a set of standards and Project-specific mitigation measures have been identified, as well as compensation where necessary.

These measures are based on professional working procedures or international good practice. They include:

- Compliance with national regulation with regards to air, noise and water quality, worker's rights and compulsory land acquisition in the public interest.
- Compliance with international standards for environmental and social performance, as established in IFC Performance Standards.
- Good human resource management and guidance of workers, including appropriate training.
- Regular internal communication and structured engagement with external stakeholders, including affected local communities.
- Implementation of an HSE sensitization and training program for workers with regular safety briefings, safety signage, personal protective equipment and monitoring.
- Use of good quality equipment and vehicles, preferably new, and regular inspection and maintenance of work engine and equipment.
- Implementation of a Waste Management Plan and a Hazardous Products Management Plan for both the construction and operation phase.
- Development of an Emergency Preparedness and Response Plan in case of accidental spillage or other accidents.
- Grievance management procedures for affected communities, workers and other affected persons.

Additional key measures to mitigate potential impacts on the **physical environment** include:

- Implementation of wastewater treatment systems.
- Implementation of collection, monitoring and waste treatment plan.
- Water resource monitoring.
- Maintaining the natural hydraulic patterns of the area and gathering of all water runoff in the central drain.
- Develop further detailed studies to manage the water in the central drain both during rainy and dry season, to avoid stagnant water and flooding downstream.

Key mitigation measures specific to activities that could impact the **natural environment** include:

- Request permits for land clearing from the Forest Inspectorate of the Atlantic Department prior to the start of clearance work.
- Exclude the sacred forest by fencing it in order to preserve it.



- Implement a Biodiversity Management Plan covering a reforestation program, measures to preserve plant and animal biodiversity and invasive species management.
- Select indigenous and native flowering plants and ornamental trees to be planted in the GDIZ area.
- Ongoing monitoring and evaluation of environment management measures and performance, with corrective action plans where necessary.

Key mitigation measures related to **social impacts** include:

- Development and implementation of a Resettlement Action Plan (RAP) that meets national legislation and IFC PS5 requirements.
- Integration of the Anavie sacred forest into the Project design by allowing residents to continue to use it.
- Management of the workforce and working conditions in accordance with Benin's national regulations, the ILO conventions ratified by Benin and the requirements of IFC Performance Standard 2.
- Priority recruitment of local labor, particularly those affected by the Project (PAP households) with equal skills.
- Inclusion of clauses for local recruitment, local sub-contracting and transfer of skills with local companies in the Tender Documents for Project construction works.
- Prohibition of recruitment at the gate(s) of the construction site and setting up a decentralized recruitment office.
- Establishment of positive discriminatory measures that will promote the employment of women.
- Implementation of a Traffic and Road Safety Plan.
- Implementation of a Hygiene, Health and Safety at Work Plan.
- Implementation of the Stakeholder Engagement Plan (SEP) and the grievance management mechanism.
- Ongoing monitoring and evaluation of social management measures and performance, with corrective action plans where necessary.

The above mitigation measures have been included in an Environmental and Social Management Plan that will have to be implemented through a comprehensive Project Environmental and Social Management System (ESMS) that will be used to deliver the Project's environmental, social, health and safety regulatory compliance objectives and other related commitments. Measures will be adopted by ARISE and imposed as contractual conditions on the Contractors commissioned for the Project. Monitoring and control will be conducted to ensure their effectiveness.

As mentioned above, detailed policies, plans and responsibilities will be developed to implement the ESMS. The timing of the development of the plans will be staged – construction related plans will be finalized and in place prior to the start of construction and the operational related plans will be finalized and in place prior to the start of operations.

## 4. Consultation and management of grievances

### 4.1. Stakeholder Engagement Plan

ARISE has adopted a Stakeholder Engagement Plan (SEP), which formed a key part of the ESIA process. The SEP analyses and identifies stakeholders, describes consultation and disclosure actions for different phases of the Project and sets out the grievance mechanism.

### 4.2. Stakeholder consultations

ARISE and the Project's ESIA team (Antea Group) have undertaken consultations with stakeholders as part of the ESIA process.

These consultations took several forms to provide maximum reach to all stakeholders and ensure meaningful, informed and participatory engagement and consultation, including via:

- preparatory meetings and site visits with local authorities, in order to show them the limits of the future site of the industrial zone;
- two public consultation meetings in the 2 arrondissements of the Project study area: on the 11th of November 2019 in Tori-Cada district and on 15th of November 2019 in Tangbo-Djevie district.
- 22 focus groups with different socio-professional and socio-demographic categories, which aimed both to collect socio-economic data and to exchange on the Project;
- individual interviews with key stakeholders to fully understand the functioning of the land system in the Project area and identify the constraints to land acquisition.



Figure 4: Public consultations in Tori-Cada and Tangbo-Djevie Districts

### 4.3. Management of grievances

ARISE has set up a grievance mechanism to receive and resolve any complaints from stakeholders and especially Project-Affected Persons, as well as ensuring fair and equal treatment for all complainants.

Persons can use this mechanism without giving up their right at any time to recourse to the Benin justice and legal system. This mechanism covers any type of complaint whatever the subject and nature, and includes the following steps:

1. Submission of complaint.
2. Registration of the grievance and acknowledgement of receipt provided to the complainant.
3. Internal assessment of the admissibility and categorization of the complaint.



4. Simple response for inadmissible complaints or immediate resolution where possible.
5. Investigation of complaints.
6. Proposal of a resolution to the complainant.
7. Resolution and closure of the complaint.
8. Mediation which can be triggered if the complainant does not accept the proposed resolution.
9. If the Project cannot resolve the complaint to the satisfaction of the complainant, legal remedy is available to the complainant.

Target timescales for resolving a complaint are:

- 14 days for resolving standard complaints;
- 24 days for high significance / complex complaints.

The Project monitors and periodically reports on grievance management to ensure that any systematic causes of grievances are addressed as quickly as possible and ensure that all grievances are managed and resolved in a fair, effective and timely manner.

At present, the contact person with whom stakeholders can lodge a grievance (or ask a question or leave a message) is the ARISE Community Liaison Officer (CLO):

Herbert Moutangou, (+229) 61450004, [herbert.moutangou@arisenet.com](mailto:herbert.moutangou@arisenet.com)

# 1. Introduction

With a view to increase its industrial potential and diversify its economy, the Republic of Benin decided to partner with ARISE in 2019, a West African company specializing in the development of industrial platforms, to develop an industrial zone adjacent to the site of the proposed New Cotonou (Glo-Djigbe) international airport.

The Glo-Djigbe Industrial Zone, hereafter referred to as ‘the Project’ or ‘Glo-Djigbe IZ’ or ‘GDIZ’, aims at the establishment of an industrial zone of quite diverse nature and importance, ranging from commercial units to small and medium-sized industrial units. These are essentially cashew nut and cotton industrial processing units (including the manufacture of clothing). GDIZ will also be open to other sectors such as pineapple, vegetable processing, building materials, consumer goods, etc. When they are approved, these industrial units will be built on plots of land serviced by the infrastructure created by ARISE.

The Project will cover a land area of 1,640 ha. However, the proposed development covers an area of 1,462 ha along with balance land being consumed under the public road as well as valley area. It will be carried out in 3 phases spread over 8 years: a first phase, covering 313.97 hectares and developed within 2 years, a second phase developing another 374.38 ha in 3 to 5 years and a final phase adding 773.59 ha in 6 to 8 years.

The construction of this industrial zone and its subsequent operation are likely to have both positive and negative impacts on the environment and the populations concerned.

As required by the national regulation, ARISE contracted the international environmental consultancy firm Antea France to conduct the Environmental Impact Assessment (EIA) for the Project in line with national regulatory requirements for local permitting purposes. This national EIA was conducted between October 2019 and February 2020 and approved by the Benin Environmental Agency on the 5<sup>th</sup> of April 2020 with the issuance of the “*Certificat de conformité environnementale*” or Environmental Compliance Certificate (ECC).

In August 2020, ARISE contracted Antea France to perform the Environmental and Social Impact Assessment (**ESIA**) for the Project complying with the International Finance Corporation Performance (IFC) Standards on Environmental and Social Sustainability. This report is the result of this work.

## 2. Presentation of the Project

### 2.1. Project background and justification

According to the African Development Bank, Benin's economic growth remained robust in 2019 (estimated at 6.7%) thanks to an increase in public investment representing 21% of GDP (ADB, 2019). Growth is driven by the agricultural sector thanks to record cotton production, the vitality of the construction sector and the dynamism of the Autonomous Port of Cotonou. Apart from these activities, the industrial sector remains poorly developed and is not a significant engine of growth for the country.

Benin's industrial fabric is characterized by the presence of small and medium-sized industries with low production and processing capacities for exportable products. There is a limited supply of industrial zones that can boost these exports in the country. Despite the creation of a general Industrial Free Zone regime (Law No. 2005-16 of September 2005) in 2005 allowing geographically defined free zones with free points or free enterprises to coexist on beninese territory, and the subsequent development of several zones, the country's industrialization objectives have not been achieved. The industrial zones created under this Act, such as that of Seme-Podji or Gakpe, do not have significant levels of activity. Other sites that were planned have not yet been developed.

In order to revive the dynamics of industrialization in the country, the Government of Benin wishes to engage in the development of GDIZ whose conception, construction and operation has been entrusted to the company ARISE, which operates within the framework of a public-private partnership with the Republic of Benin.

This Project will meet one main objective: to industrialize the country by offering favourable conditions for the establishment of companies within the national territory in order to diversify the country economy focused on processing of the agro-commodities.

Several factors are currently favourable to the establishment of an industrial zone, such as the continuous improvement of the business climate, investment opportunities, the facilitation of the installation of industries or the growing supply of skilled workers.

The construction of GDIZ is part of a vast development plan for the north-western area of Cotonou planned by the Government. It also provides for the creation of a special economic zone (SEZ), the Glo-Djigbe SEZ, and the New Cotonou (Glo-Djigbe) International Airport.

## 2.2. Location of the Project

GDIZ will be located close to the future New Cotonou (Glo-Djigbe) international airport, about 40 km from Cotonou, as shown on the Project location map below.



Figure 5 : Location of the Project area

It will be positioned on the territory of 2 municipalities, Tori-Bossito and Ze in the Atlantic Department. There are 8 villages which are the closest to the Project site (from 200 to 800 meters from the site boundaries):

- Dokanme, Gbetaga, Sogbe and Zebe in that of Tori-Bossito.
- Agbodjedo, Anavie, Djitin-Aga and Houeze in the municipality of Ze.

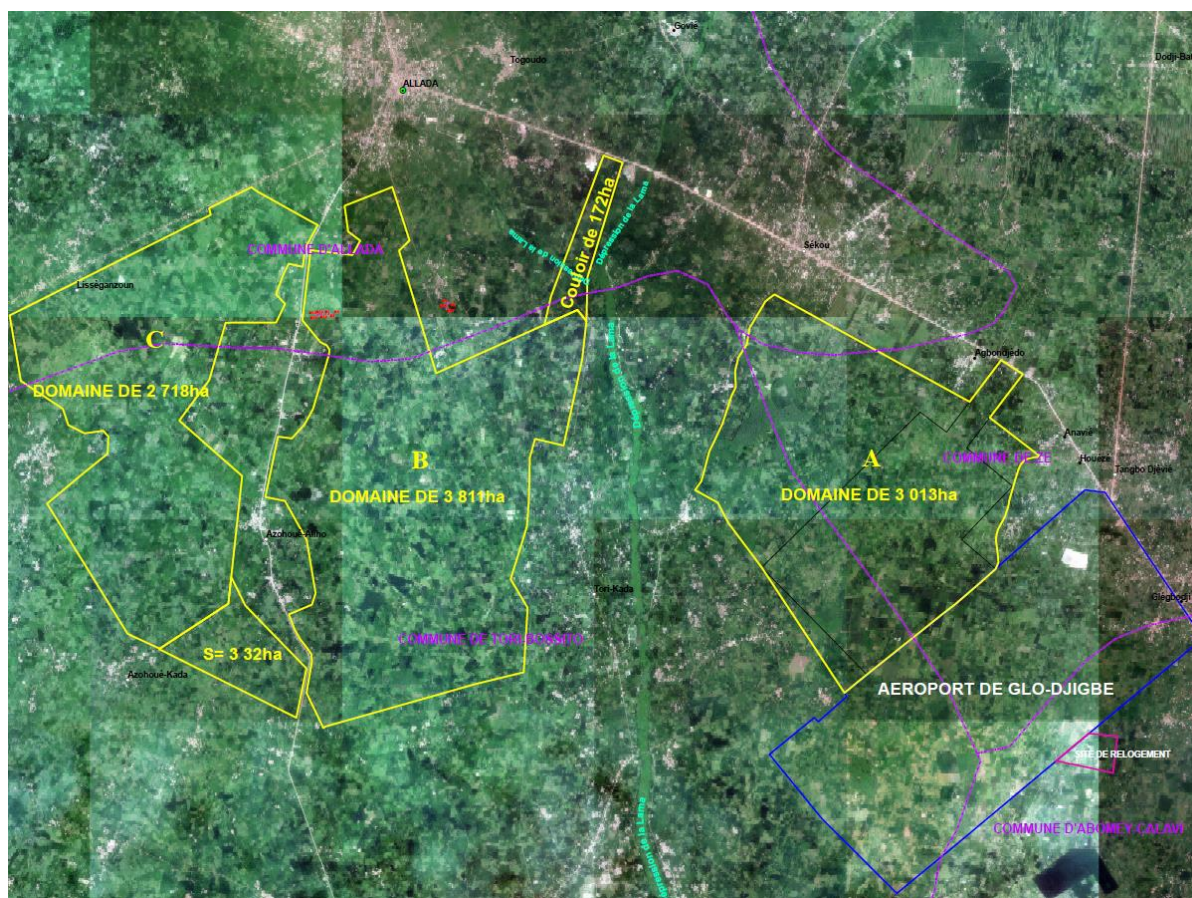
## 2.3. Integration of the Project into the broader Glo-Djigbe development plan

GDIZ is part of 10,000 Ha of land notified by the government under the regime of declaration of public utility for the future industrial development of the Glo-Djigbe area in the municipalities of Abomey-Calavi, Tori-Bossito and Ze. This area will be organized in 3 domains:

- domain A, with an area of 3,013 ha;
- domain B, with an area of 3,811 ha;
- domain C, with an area of 2,718 ha.

The Project site will be integrated into domain A, as shown on the map below (see Figure 2).





(Source: IGN for ARISE, 2020)

Figure 2: Location of the Special Economic Zone of Glo-Djigbe

### 2.3.1. Regulatory framework and objectives of the SEZ

The Glo-Djigbe development plan will fall under the law n°2017-07 of June 19, 2017 establishing the regime of Special Economic Zones in the Republic of Benin. Insofar GDIZ will comply with this law and operate in accordance to the regime set by the said law.

According to this law, “the zone is characterised by a special status within the national territory, to promote the development of an economic node by the implementation of a policy to encourage national and foreign investment by means of benefits and advantages including the facilities for simplified administrative procedures as well as operational ease”.

The objectives of the development set up under the law is to:

- promote and attract industrial, agro-industrial, agri-food and agricultural investments by encouraging the establishment of production units;
- promote the development of exports and direct investment, both beninese and foreign;
- rehabilitate and increase the available infrastructure with a view to promoting Benin's socio-economic development;
- increase the competitiveness of the beninese economy;
- foster the development of national resources;
- encourage the private sector to participate in the development, operation and maintenance of the areas, including infrastructure development;

- facilitate the creation and promotion of jobs.

In accordance to the law, the State promoted area shall be entrusted to a public or private company for its development, organisation and promotion and would be called as the "Area planning and management company", based on pre-established specifications. This company would be established in accordance to the law No. 2017-07 for the achievement of the stated objectives.

The management company is responsible for:

- constructing and maintaining traffic roads, water and electricity supply networks, sewerage and telecommunications networks, infrastructure (fence walls, etc.), lighting of access and traffic routes, etc.;
- ensuring the leasing of land and buildings to investors, the distribution of water and electricity, the surveillance and security of common areas and access to the area, the control of construction and movement of goods;
- ensuring the commercial promotion of the SEZ/Industrial Zone, welcoming investors and assisting them in their application for approval.

It is subject to the control of an Administrative Authority (see Chapter 1 of Law N°2017-07 of 19 June 2017) which ensures the application and respect of the legislation in force by the Area Area planning and management company and by all investors and stakeholders in the SEZ/Industrial Zone.

The Administrative Authority is also responsible for:

- the follow-up of the specifications of the management company;
- the setting up of connections of the SEZ/Industrial Zone with all the public infrastructures outside the SEZ necessary for its proper functioning;
- the establishment of a one-stop shop for formalities and administrative procedures for SEZ/Industrial Zone operators.

### **2.3.2. Securing the land for the Glo-Djigbe development area**

On 15<sup>th</sup> January 2020, the Government of Benin promulgated the Declaration of Public Utility (DUP) for the Glo-Djigbe development area in the Council of Ministers (see Annex I). This text marks the first step in securing the land tenure of the site, which will be carried out in the coming months. Thereafter, "the Ministers involved in the development will take subsequent steps to secure the site, carry out land and property assessments, and compensate those affected".

### **2.3.3. Assessment of the environmental impacts of the Glo-Djigbe development area**

This ESIA does not address the study of impacts arising from the establishment of the 10,000-ha Glo-Djigbe development area declared by the State under the DUP promulgated on 15<sup>th</sup> January 2020. These impacts will be studied through 3 Strategic Environmental and Social Studies (SESA) - one for each area - which will be commissioned by the Beninese Environment Agency on behalf of the Government in the coming months.

## 2.4. Project governance

### 2.4.1. Presentation of promoters and developers

The Project is led by a joint venture formed by the company ARISE and the Republic of Benin. This joint venture, the *Société d'Investissement et de Promotion de l'Industrie Benin* (SIPI Benin), will be responsible for managing GDIZ.

#### 2.4.1.1. ARISE



ARISE is a company formed by the joint venture partnership of Africa Finance Corporation and OLAM International (a Singapore based company). ARISE is a West-African industrial ecosystem developer who designs, creates, finances, and builds interconnected infrastructure, in addition to providing logistical solutions. It started its activities in Gabon with the creation, in partnership with the Gabonese State, of the Nkok Special Economic Zone. Today, it wishes to implement other ambitious projects of industrial zones across the continent. To do so, ARISE has re-organised its business into 3 separate business lines: ARISE Port & Logistics ("ARISE P&L"), ARISE Integrated Industrial Platforms ("ARISE IIP") and ARISE Infrastructure Services ("ARISE IS").

Glo-Djigbe Industrial Zone is a Project under ARISE IIP, one of the few ventures outside Gabon.

#### 2.4.1.2. ARISE Mauritius

ARISE has created ARISE Mauritius, a company that represents ARISE for its partnership with Republic of Benin.

#### 2.4.1.3. Société des patrimoines immobiliers de l'Etat (SoPIE)

SoPIE is a private company whose only shareholder is the Republic of Benin. It was created in 2018 with the objective to improve the management of public infrastructures, especially those used for trade, leisure, sport or tourism such as museums, hotels and leisure centres.

#### 2.4.1.4. SIPI Benin

ARISE Mauritius and the Government of Benin, through SoPIE, have invested jointly into the creation of a joint venture, SIPI Benin. SIPI Benin will be responsible for the Project development, construction and operation.

## 2.4.2. Project governance structure

The following scheme summarizes the governance structure of the Project.

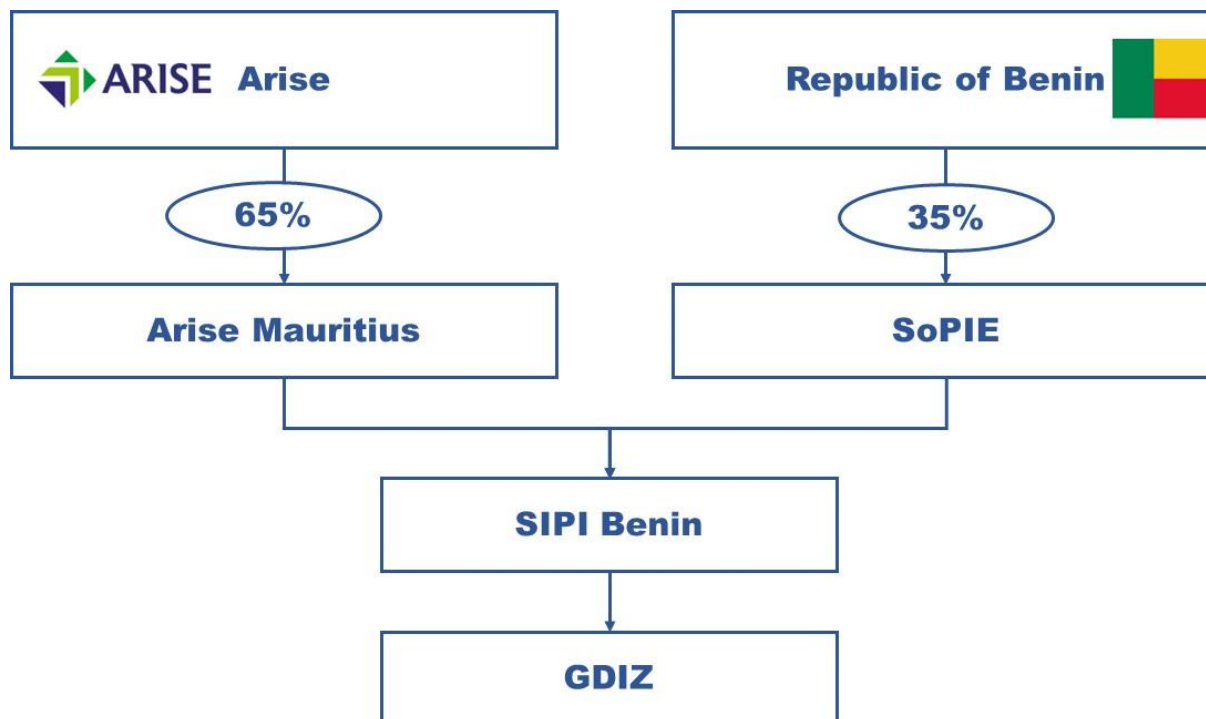


Figure 6 : Project governance structure

## 2.5. Presentation of the Environmental and Social Impact Study

### 2.5.1. Legal framework for environmental assessment in Benin

All construction or public development projects in Benin are subject to laws and regulations to protect the quality of the country's environment.

The obligation to carry out an ESIA is based on the Framework Law on the Environment (98-030 of 12 February 1999) of the Republic of Benin, which, inter alia, in Title V, Chapter I, Article 87-93, imposes the impact assessment procedure.

Environmental assessment, which includes the environmental and social impact assessment (ESIA), is governed by **Decree No. 2017-332 of 6<sup>th</sup> July 2017 on the organisation of environmental assessment procedures in Benin**. The decree sets out the administrative procedure for the issuance of the ECC by the Minister in charge of the environment.

The environmental assessment process in Benin leads to an Environmental Conformity Certificate (ECC) issued by the Environmental Authority. The Environmental Authority is represented by the Beninese Environment Agency (ABE) under the responsibility of the Ministry of Living Environment and Sustainable Development (MCVDD).

According to article 24 of the decree "any project whose activities are likely to have an impact on the environment are subject to an environmental impact study. The environmental impact study may be simplified or extended".

A simplified environmental impact assessment relates to "a project whose activities are not likely to significantly alter the environment". A comprehensive environmental impact assessment must be



conducted for "a project whose activities are either likely to significantly modify the environment or are planned to be carried out in a risk or environmentally sensitive area". Annex 1 of the decree thus specifies which projects are considered to operate in sensitive areas and must therefore be subject to an in-depth ESIA.

Although the Project does not meet the criteria specified in Annex 1 of the decree, the size of the land needed to carry out the Project (1,640 ha) and its agro-industrial vocation indicate it is a Project likely to significantly modify the environment, requiring a thorough environmental impact assessment.

As part of the environmental assessment process, the Terms of Reference (ToR) was the first document prepared to frame the ESIA. The ToRs are presented in Annex I of this report. They were submitted for preliminary Project information and request for necessary directions to the ABE on 20<sup>th</sup> December 2019.

### 2.5.2. Scope of the ESIA

This ESIA concerns the development and improvement of GDIZ by ARISE.

As such, it studies the specific impacts of the activities of site servicing and construction of common infrastructures that will be made available to companies wishing to set up in the area.

It does not constitute a study of the impacts of the companies that will establish themselves in the industrial zone once it is operational. Each of these companies will therefore, in accordance with decree n°2017-332, have to carry out a simplified or in-depth ESIA according to the specific categorization of their activities.

However, ARISE will work on an umbrella ESIA to analyse the impacts at the best of their understanding by the nature of industries which will come for setting up their operations within the zone. This process will greatly simplify the ESIA process required by the individual companies. ARISE also plans to create a sustainability framework apart from the general operational guidelines covering sensitive aspects like health, safety and environment along with prevention measures to be respected by the companies with respect to the following:

- construction of buildings;
- drainage and wastewater management;
- water supply and distribution;
- use of energy and resources;
- solid waste management.

### 2.5.3. Objectives of the Environmental and Social Impact Study

The objectives of this ESIA report are to:

- apply Benin's regulatory obligations in order to obtain the certificate of environmental compliance issued by the ministry in charge of the environment;
- satisfy international standards and especially IFC performance standards;
- evaluate the risks and potential impacts resulting from the implementation of the Project in its study area;
- identify all possible measures to avoid, reduce and compensate for undesirable impacts;
- evaluate the action plans, human and financial means necessary for the implementation of these measures;

- consult the population affected by the Project to collect their fears, needs and suggestions in order to take them into account in the avoidance, reduction, compensation and improvement measures.

#### **2.5.4. Consultancy office in charge of carrying out the ESIA**

This ESIA was conducted by Antea Group. Antea Group is an international environmental engineering and consulting company offering global solutions in the fields of Environment, Infrastructure, Land Use Planning and Water. Antea France and Antea Benin have collaborated to carry out this study.



Antea France's main areas of activity are the environment, water, infrastructure and waste management. Antea Benin is involved in the environmental assessments of major projects (MCA-Benin in particular) as well as the management of coastal erosion phenomena.

#### **2.5.5. Work team**

The working team mobilized by Antea Group to carry out this study is composed of environmental and social experts. More specifically, the team was composed of the following experts:

- Armeline DIMIER, project manager and societal expert;
- a team of environmentalists consisting of a two-person management team with Murielle FREITAS (Professional Master II in Environmental and Social Assessment) and Janvier ATCHO (Professional Master II in Environmental and Social Assessment) and an environmental data collection team in the field. : Delonou Barthélémy SOHOUENOU (Professional Master II in Environmental and Social Assessment), Justine Houevoh HOUNDO (Master II in Risk and Disaster Management) ; FANTODJI Benjamin (Professional Master's Degree in Planning and Management of Natural Resources);
- a team of sociologists led by Sylvie KPODJEDO, senior societal expert, and a data collection team composed of ZOCLI Firmin and ATINDEGLA Germaine;
- a team of cartographers with Sylvestre KPAKPO and Ulysse GBAGUIDI.

#### **2.5.6. Organization of the report**

In accordance with the IFC performance standards, the report is structured as follows:

- Non-technical summary;
- Chapter 1 Introduction;
- Chapter 2 Project presentation
- Chapter 3 Institutional, legislative and regulatory framework;
- Chapter 4 Project description;
- Chapter 5 Analysis of alternatives;
- Chapter 6 Environmental and social baseline;
- Chapter 7 Analysis of impacts and identification of management measures;
- Chapter 8 Analysis of the risks of technological accidents;
- Chapter 9 Public participation and consultation;

- Chapter 10 Environmental and social management plan.

As part of this study, ARISE required a Stakeholders Engagement Plan (SEP) to be developed to accompany the implementation of its stakeholder dialogue strategy. This Plan is presented in Annex II.

### **2.5.7. Limitations**

This ESIA was conducted based on the Project description presented in § 4. Additional technical studies were not, at the time of writing this report, available. These studies are:

- hydrogeological study to assess aquifer characteristics including impact resource modelling in operation phase,
- drainage network dimensioning and associated hydraulic study,
- STP and CETP design studies presenting dimensioning and functioning characteristics,
- waste transfer stations and composting trenches design.

Therefore, the impact assessment presents some limitations in its accuracy.

## 3. Institutional, legislative and regulatory framework

In Benin's administrative organization, there are central and local structures that have a link with the environment, social issues, the construction of infrastructure and, in general, the process leading to the implementation of a project. Thus, the legislative and regulatory provisions on which these structures are based constitute the legal framework and are of 2 types:

- **International texts** including, on the one hand, the Conventions and Treaties to which Benin has acceded and which have been ratified, and, on the other hand, the Agreements signed by Benin and whose contents relate to the environment and the living conditions of the populations.
- **National texts**, including the Constitution of the Republic of Benin, beninese laws in force concerning the environment and the living conditions of the population, and regulatory texts in force in Benin relating to the environment and the living conditions of the population (decrees, orders, circulars).

### 3.1. Institutional framework

This section presents all public institutions whose areas of intervention, policies, regulations or laws are relevant to the Project, either because they concern the Project and its implementation directly, or because they are related to the Project's impacts and their management.

It is worth noting that almost each Ministry has a devolved structure in the Atlantic-Littoral Department, in the form of a Departmental Directorate.

#### 3.1.1. Ministry of the Living Environment and Sustainable Development and its structures

##### 3.1.1.1. Ministry of the Living Environment and Sustainable Development

Benin has given a capital place to the environment through its Constitution, and in order to achieve its objectives of protecting the environment and people's living environment, the Government created a Ministry in charge of the Environment in 1991.

Currently called the Ministry of the Living Environment and Sustainable Development (MCVDD) by Decree No. 2016-50 of 11 August 2016, its main mission is to define, monitor the implementation and evaluation of State policy on housing, urban development, urban mobility, cartography, geomatics, land use planning, sanitation, environment, management of the effects of climate change, reforestation, protection of natural and forest resources, preservation of ecosystems, protection of banks and coastlines. It also participates in the definition of the State's land tenure and cadastre policy.

Its main responsibilities are, among other things:

- to define and periodically update national policies on the quality of the living environment and sustainable development and to ensure their implementation;
- to elaborate and ensure the monitoring of compliance with technical standards and regulations in all areas of its competence;
- to apply the Community directives relating to its areas of competence within the framework of African integration policy;

- to assist local authorities in the design, organisation and management of activities within its areas of competence.

Regarding environmental protection and sustainable development, it is responsible for:

- to apply the procedures and measures to improve the quality of the living environment and to combat all forms of pollution;
- to organize and to promote trades and professions related to the environment, the management of the effects of climate change, the rational management of forest and wildlife resources, housing, urban planning and development;
- to follow-up the execution of Benin's commitments in the field of sustainable development and of international and regional conventions relating to its fields of competence.

The MCVDD therefore plays an essential role in safeguarding and managing the environment. In charge of the elaboration of the national policy on sustainable development, it ensures that the programs and projects envisaged or in progress on the national territory are carried out in accordance with the legislative and regulatory provisions in force.

For effective consideration of environmental concerns and adequate application of environmental assessment procedures, the MVCDD is supported in its missions by the Technical Directorates detailed in the following sections.

In this Project, the MCVDD has the prerogative to issue the certificate of environmental compliance necessary for its application.

#### **3.1.1.2. Beninese Environment Agency**

In accordance with decree n°2010-478 of 05 November 2010, the Beninese Environment Agency (ABE) is the entity in charge of the implementation of the environmental policy defined by the Government within the framework of the general development plan.

According to the provisions of Law No. 98-030 of 12 February 1999 on the framework law on the environment in the Republic, the ABE gives its technical opinion to the MCVDD or even to the Government on the authorization to undertake or operate works or establishments subject to ESIA, on the environmental feasibility of the plans, programs and projects to be carried out and on the initiation and execution of the external environmental audit. Thus, it oversees the instruction of requests and files concerning the environmental assessment procedures prescribed by decree n°2017-332 of July 6, 2017 on the organization of environmental assessment procedures in the Republic of Benin.

#### **3.1.1.3. National Agency for Territorial Planning**

The National Agency for Territorial Planning (ANAT - formerly called Delegation for Regional Planning) is a social, scientific and cultural office created in 2003 by decree n°2003-374 and operational since 2004. Its attributions have been defined in decree n°2018-490 of October 17, 2018 on the attribution of the statutes of the National Agency for Territorial Planning. It is responsible for implementing Act No. 2016-06 on the framework law on land use planning in Benin.

Its missions are is to:

- elaborate and ensure the implementation of the national policy on spatial planning, with the support of the various administrations involved;
- initiate the elaboration of spatial planning documents at national, sectoral and local levels such as the Master Plan for Spatial Planning (SDAT), the Territorial Planning and Development Plan (STAD), the Collective Services Plans (SSC), etc.;

- participate in the coordination of major achievements to promote the economic development of the regions;
- contribute to the improvement of land management in Benin, with a view to securing public and private investment and the permanent constitution of land reserves to accommodate major projects;
- act as an interface between Community policies (ECOWAS, UEMOA) and national spatial planning policies.

The vocation of ANAT is to ensure the spatial coherence of major structuring projects prior to their implementation, of which the present Project is a part.

#### **3.1.1.4. Departmental Directorate for the Living Environment and Sustainable Development for Atlantic/Littoral**

The Departmental Direction for the Living Environment and Sustainable Development of the Atlantic and Littoral (DDCVDD-AL) oversees implementing, at the departmental level, the national policy on the living environment and sustainable development. This department monitors the implementation of MCVDD projects in the field and reports periodically to the Prefect and the Minister of the Living Environment and Sustainable Development. It ensures the management of sectoral action plans, technical assistance and advisory support to the municipalities in accordance with the laws.

More concretely, it is in charge of:

- assisting the communal and departmental authorities on matters falling within their areas of competence;
- drawing up and contributing to the implementation of the departmental decentralization and deconcentration plan in application of the national decentralization and deconcentration policy;
- monitoring and supervising the application of standards and legislative and regulatory texts on the environment, nature protection, urban planning, sanitation, urban roads, urban mobility, housing, construction and cartography;
- monitoring all activities of the municipalities contributing to the improvement of the population's living environment.

#### **3.1.1.5. Other directorates and organisms for the protection and management of the environment**

##### **3.1.1.5.1. General Directorate of Water, Forests and Hunting (ex- General Directorate for Forests and Natural Resources)**

The Forestry and Hunting Water Directorate (DGEFC) is a paramilitary structure, one of the components of the public security forces and assimilated, whose mission is to ensure the development and rational management of natural resources (forest, wildlife and others). As such, it is responsible, among other things, for developing State policies and strategies as well as legislative and regulatory texts and other instruments and tools for reforestation and sustainable management of natural resources (forest, wildlife and others) and ensuring the monitoring-evaluation of their implementation. It works with the support of the forestry inspectorates that make up its deconcentrated structures.

#### **3.1.1.5.2. National Geographic Institute**

Under decree n° 98-447 of October 15, 1998 approving its statutes, the National Geographic Institute (IGN) is responsible for the production, conservation and dissemination of basic geographic information.

As such, this organism is responsible for the gradual establishment, conservation and dissemination of basic geographic equipment in the national territory. It is also responsible for the establishment and conservation of the basic cartographic documents necessary for: urban land registers; rural land plans; national cadastre.

As part of the Project, IGN's mission is to identify the area suitable for the implementation of the Project, to identify the geographic coordinates and topography of the Project site and to install the physical delimitation terminals of the Project site.

### **3.1.2. Ministry of Industry and Trade**

The mission of the Ministry of Industry and Trade is to design, implementation, monitoring and evaluation of the general policy of the State in terms of promotion of industry and trade in accordance with the laws, regulations and other legal instruments in force in the Republic of Benin.

As such, its missions are to:

- define and propose Benin's industrial and commercial policies in liaison with the ministries concerned;
- contribute to the definition and implementation of a national policy of regional integration in the fields of industry and trade;
- contribute to the continuous improvement of the regulatory, institutional and economic environment for business and investment;
- propose an integrated strategy for the industrial processing and marketing of products, considering incentives for social protection, access to credit and reduction of tax burdens, in collaboration with the structures and ministries concerned;
- develop a strategy to identify the different categories of investors, prospecting countries and promising markets for local products;
- identify commercial, community and international trade frameworks that can be exploited and to accompany companies in the search for financing or in negotiations for equitable partnerships;
- develop export promotion programs that include small producers and targeted commodity and regional promotional programs;
- define and ensure the functionality of effective, equitable and sustainable consultation mechanisms between the private sector, public services and civil society;
- work towards the establishment and enforcement of quality, health and environmental standards governing international trade.

#### **3.1.2.1. Industrial Development Department**

The mission of the Directorate General of Industrial Development is to carry out or commission studies to draw up and implement industrial development strategies.

As such, its missions are to:



- draw up and propose industrial policies and development programs aimed at integrating, strengthening and enhancing the value of flagship sectors to be promoted;
- carry out a diagnosis of the industrial value chain by analysing the various links in the circuit, from production to consumption, in order to determine quality assurance objectives;
- follow-up the evolution of the national industrial fabric for the valorisation of local raw materials and the integrated development of promising agro-industrial sectors, in collaboration with the ministry in charge of agriculture;
- contribute to the emergence of industrial clusters compatible with rational and sustainable regional development;
- set up and daily update an interconnected file of companies and industrial techniques;
- ensure, in liaison with the ministries concerned, the study of authorisation files for the installation of industrial enterprises;
- ensure the continuous improvement of the institutional environment and contribute to the elaboration and application of regional or international texts in the field of industry;
- monitoring the domestic taxation of industrial enterprises and making proposals that contribute to making these enterprises competitive.

### **3.1.2.2. General Directorate for Trade**

The General Direction of Trade is responsible for formulating and implementing national policy on internal and external trade, competition, prices and the fight against fraud.

It coordinates the activities of the Directorate of Internal Trade, the Directorate of External Trade, the Competition Directorate and several secretariats in order to achieve its objectives.

### **3.1.2.3. Departmental Directorate of Industry and Trade for Atlantic/Littoral**

The Departmental Directorates are responsible, at departmental level, to:

- coordinate, control and monitor all actions for the promotion of industries and commercial activities;
- follow the evolution of the industrial fabric to direct investment in favour of the valorization of local raw materials and the integrated development of promising sectors;
- ensure the respect of the legislative and regulatory texts relating to the exercise of industrial and commercial activities;
- assist promoters and local authorities in seeking partnerships and sources of funding for the implementation of their projects;
- encourage the creation of consumer associations and assist them in their mission of defending consumer interests;
- deliver the various professional cards and update the directories of manufacturers and traders.

### **3.1.3. Ministry of Agriculture, Animal Husbandry and Fisheries**

Governed by Decree No. 2012-541 of 17 December 2012, establishing its attributions, organization and functioning, the Ministry of Agriculture, animal husbandry and Fisheries is responsible for the design, coordination, implementation and monitoring-evaluation of the State's policy in terms of improving



production, the income of producers in the Agriculture, Livestock and Fisheries sectors and the standard of living of the population, in accordance with the laws and regulations in force in Benin and the Government's development visions and policies.

As such, its missions are to:

- define policies in the areas of its competence:
  - agriculture, animal husbandry and fisheries;
  - agricultural research, extension and advice rural legislation, planning and rural equipment;
  - the promotion of rural youth and the promotion of women's activities in rural and peri-urban areas in agriculture, animal husbandry and fisheries;
  - promotion of the quality and packaging of agricultural products;
  - food and nutritional security;
  - Training, support and advice;
  - storage/preservation, processing and marketing of agricultural products.
- determine the conditions favourable to the realization of the objectives by identifying the constraints and potentialities of the rural sector and by evaluating the needs in material, human and financial means necessary for the achievement of the set objectives;
- determine the conditions favourable to the concretization of the policies defined by identifying the constraints and potentialities of the rural sector and by evaluating the needs in material, human and financial means necessary for the achievement of the fixed objectives;
- promote technical progress in agriculture, animal husbandry and fisheries;
- facilitate with the Ministries concerned the exploitation of natural resources at levels compatible with the ecological balance for the satisfaction of the needs of the populations;
- create an incentive environment and an appropriate legislative, regulatory and fiscal framework to encourage investment in the agricultural and rural sector;
- provide the actors in the sector with the necessary tools to increase agricultural production;
- technical assistance and agricultural productivity and production;
- coordinating, monitoring and evaluating the implementation of policies and actions in the context of the achievement of the objectives set in the fields of its competence;
- define the appropriate regulations and ensure their application;
- increase and develop the food potential through the development and dissemination of technologies for storage/preservation and processing of products;
- define measures to promote and improve the functioning of cooperative societies, common-initiative economic groupings and other agricultural institutions and to ensure their implementation;
- facilitate the development of agricultural entrepreneurship;
- monitoring and coordinating the activities of other actors involved in the agricultural and rural sector;

- work together with other actors (public and private) to promote and/or develop agricultural sectors work within the framework of sub-regional and international cooperation to promote the agricultural sector;
- ensure the safety of agricultural products.

In the context of this Project, one of the significant socio-economic impacts relates to the disruption of agricultural activities in the Tori-Cada and Tangbo-Djevie districts. It is therefore imperative that the General Direction for Agricultural Development, Food and Nutrition be involved in the implementation of this Project as well as the Territorial Agency for Agricultural Development Pole 7 which covers the departments of Oueme, Atlantique and Mono. It is the decentralised structure of the MAEP that coordinates agriculture in these departments.

### **3.1.4. Ministry of Health**

It is responsible for implementing the Government's health policy. Within this framework, it coordinates and monitors the implementation of the health activities.

#### **3.1.4.1. National Directorate of Public Health**

It is the coordinating agency for the monitoring and evaluation of collective and individual measures for prevention, prophylaxis and health promotion. It is responsible for school health.

#### **3.1.4.2. Infrastructure, Equipment and Maintenance Direction**

It is the agency responsible for the design, monitoring and evaluation of civil engineering activities (construction, rehabilitation and maintenance). It is also the body in charge of the management and maintenance of the medico-technical equipment of the Ministry of Health.

As such, its roles are to:

- contribute to the updating of standards for health infrastructures, in collaboration with the Ministry in charge of housing;
- design the construction and rehabilitation plans of the infrastructures in relation with the technical departments concerned;
- monitor and evaluate the implementation of the program for the construction or rehabilitation of health infrastructure, in collaboration with the Ministry in charge of housing;
- follow up and evaluate the maintenance of health facilities.

#### **3.1.4.3. Departmental Directorate of Health for Atlantic/Littoral**

The Departmental Directorate of Health for Atlantic/Littoral (DDS-AL), in accordance with Act No. 2146/MSP/DC/SGM/SA of 21 March 2003 on the powers, organization and functioning of the Departmental Directorates of Public Health, is responsible for implementing the health policy defined by the Government, planning and coordinating all the activities of health services in the periphery and ensuring epidemiological surveillance. Thus, it carries out the integration of all health activities at the level of the 2 departments. In other words, it plans, coordinates, supervises and controls all the activities of the health services, both in the implementation of national programs and in the operation of the health zones and public and private health facilities in the department.

In a pivotal position between the central level of the health pyramid and the peripheral level, the DDS-AL executes instructions from the Ministry of Health, reports to it on the execution of activities and

provides feedback to the decentralized structures. It has an administrative and technical support role with a view to ensuring the best possible application of the policies, national strategies and regulations in force in the sector.

In the execution of its attributions, the DDS-AL covers 7 Health Zones of the Atlantic and Littoral departments. Among these 7 health zones, 2 concern the Project area:

- the Allada/Zê/Toffo Health Zone;
- the Ouidah/Kpomasse/Tori-Bossito Health Zone.

Within the framework of this Project, the Ministry of Health, through its decentralized services, will rely on the DDS-AL for the monitoring of health actions and the Information, Prospective and Advice Centre (CIPEC) for the monitoring of information-education-communication activities on HIV-AIDS and sexually transmitted diseases (STDs).

### **3.1.5. Ministry of Infrastructure and Transport**

The mission of the Ministry of Infrastructure and Transport is to develop and ensure the implementation and monitoring-evaluation of the general policy of the State in terms of land, maritime, fluvio-lagunar and air transport as well as public works and other infrastructures, in accordance with the laws and regulations in force in the Republic of Benin.

The Directorate of Land Transport missions are to:

- develop a strategy for the organised, safe and peri-urban traffic of road hauliers;
- organise, regulate and monitor road and rail transport, in particular regarding the safety of goods and persons and environmental and noise pollution;

#### **3.1.5.1. Departmental Directorate for Infrastructure and Transport for Atlantic/Littoral**

The Departmental Directions of Infrastructures and Transport are the branches of the Ministry in the territorial departments.

They are responsible for the management of sectoral action plans, technical assistance and advisory support to municipalities in accordance with the laws on decentralization. They are placed under the authority of the Prefect of the department and participate in the departmental administrative conference to ensure the coherence of State interventions in the department. As such, they are responsible for:

- monitoring and controlling the application of standards and laws and regulations in the field of transport and infrastructure;
- managing the road network within its territorial jurisdiction and carrying out maintenance work;
- monitoring and control of construction, maintenance, rehabilitation, development and asphaltting of roads and/or construction works carried out on its territory;
- providing advisory assistance to local authorities in the design, development and management of urban, interurban and rural transport.

### **3.1.5.2. National Road Safety Centre**

The National Centre for Road Safety (CNSR) is a public administrative and social institution under the supervision of the Ministry of Infrastructure and Transport. Its main mission is "the study, research and implementation of all means intended to increase the safety of road users, in particular through measures to prevent and combat road accidents", a mission for which the following attributions have been defined:

- road safety education;
- information and awareness of road users;
- training and development of drivers and retraining of driving licence examiners;
- vehicle roadworthiness testing;
- monitoring compliance with the highway code;
- the organisation and running of commissions for the withdrawal of transport tickets following traffic violations.

The CNSR's resources come mainly from the vehicle roadworthiness testing operations for which it has a national monopoly. Thus, while being one of the important road safety actions (prevention of road accidents related to the condition of rolling stock), roadworthiness testing makes it possible to finance all the other road safety activities carried out each year by the CNSR.

The CNSR works in collaboration with several state structures and several NGOs, as well as local elected officials at the national level and is in contact with several sub-regional, regional and international organisations dealing with road transport and road safety issues.

### **3.1.6. Ministry of Labour, Public Function and Social Affairs**

The mission of the Ministry of Labour, Public function and Social Affairs is to define, implement, monitor and evaluate State policy on labour, the civil service, administrative and institutional reform, the family, national solidarity, employment, microfinance and equal opportunities, in accordance with the laws and regulations in force in the Republic of Benin and the Government's development visions and policies.

In this capacity, it is responsible for the promotion of labour:

- to design, monitor and control labour and social security legislation;
- to design, monitor the implementation of employment promotion policies in all sectors, in collaboration with the technical structures of the ministries concerned;
- to define and implement social protection policy for workers in the formal and informal economy.

The Ministry is also involved in the promotion of the family, women, gender and the reintegration of disabled persons with the following missions:

- to contribute to the development of activities contributing to the preservation of family cohesion, the improvement of family living conditions and the social reintegration of children in difficult circumstances;
- to contribute to the design and implementation of programs to promote gender equality and equity in the educational, social, economic, cultural, political and legal fields;

- to coordinate, promote and evaluate the actions of Non-Governmental Organizations working for the promotion of gender equality and equity and the well-being of the population;
- to promote women's associative life and encourage a spirit of entrepreneurship among women in synergy with all other public structures;
- to design, coordinate, monitor the implementation and evaluate the national policy on national solidarity and social protection;
- to promote the socio-economic integration of persons in difficulty;
- to develop strategies for social protection and the development of solidarity mutuals in collaboration with the ministries and organizations concerned;
- to organize, monitor and evaluate, in collaboration with the structures concerned, psycho-social care actions for persons infected and affected by HIV/AIDS in collaboration with the Ministry of Health;
- to contribute to the development of human capital through information, education and communication activities in urban and rural areas.

The Ministry is also responsible for microfinance, entrepreneurship, youth employment and equal opportunities, with the following main responsibilities:

- coordinate and harmonize the promotional actions of the different actors in the microfinance sector, in collaboration with the Ministry in charge of finance;
- to assist the promoters of microfinance institutions in the strengthening of their structures;
- to support the training of actors in the microfinance and entrepreneurship sector;
- to ensure training and the dissemination of information relating to the promotion of the microfinance sector and other forms of support for decentralised financial systems;
- to support any approach to developing innovative financial products adapted to the needs of the microfinance sector in collaboration with the Ministry of Finance;
- to elaborate the national strategy for the development of professions and jobs in each sector to support the promotion of youth employment in the municipalities;
- to facilitate the reception of young persons in pre-qualification professional internships in all sectors with a better supervision preparing them for self-employment;
- to promote in all sectors, entrepreneurship and the promotion of practical jobs among young graduates;
- to promote, in collaboration with other ministerial departments, the development of cooperative entrepreneurship to support young persons' access to employment.

### **3.1.6.1. General Directorate of Labour**

The General Directorate of Labour is the body for the promotion of the State's labour policy. It is responsible for:

- designing, implementing, monitoring and evaluating national labour policy;
- designing and drafting laws, regulations and agreements relating to labour, manpower and social security;
- to promote international relations in the field of labour;
- promoting health at work;

- promoting social dialogue in the workplace;
- promoting social security in all sectors of activity;
- promote the fight against child labour.

### **3.1.6.2. National Social Security Fund**

The National Social Security Fund (CNSS) manages the occupational risks of salaried employees as well as trainees and apprentices, even unpaid ones, among other responsibilities.

The CNSS provides health coverage to affiliated salaried workers, who are then protected in the event of an accident at work or an occupational disease. The employer must register all employees with the CNSS within 24 hours of recruitment.

The CNSS also provides support services to employers to raise awareness of occupational hazards. On this occasion, various themes relating to the risks specific to each type of work are addressed and discussed with workers divided into groups.

The CNSS deals mainly with technical prevention. As such, it carries out the following actions:

- participation in the setting up of Health and Safety Committees (CHS) in companies;
- training of CHS;
- information and sensitization of workers and employers;
- control and monitoring of working conditions;
- investigations in the event of accidents at work;
- keeping statistics on occupational accidents and diseases.

The CNSS also carries out monthly or unannounced technical inspections of employers in order to:

- detect anomalies and check working conditions;
- obtain information on the internal prevention structures, in particular the CHS, their organisation, methods and modes of action.

Finally, the CNSS carries out investigations in the event of a work-related accident in order to collect on site the real causes of the serious accident's occurrence and to determine who is responsible.

### **3.1.7. Ministry of Planning and Development**

The mission of the Ministry of Planning and Development is to promote economic and social development and to monitor the implementation of Government policies, programs, projects and decisions on national, regional and local development. It draws up long-term development strategies enabling Benin to take better advantage of the challenges of the future in terms of developing national potential and anticipating the problems associated with its development.

In this capacity, it is responsible for:

- to centralize and promote inclusive development projects;
- to contribute to the elaboration of strategies for the promotion of regional and local development that are sensitive to equal opportunities and the well-being of the population;
- ensure the implementation and monitoring of the Government's policies, actions and decisions aimed at achieving the Millennium Development Objective (MDO) and the Sustainable Development Objective (SDO), in conjunction with the ministries concerned;

- prepare and conduct, in collaboration with the structures concerned, programs to promote private investment;
- promote, in consultation with the structures concerned, the development of the private sector and productive investments that generate employment.

#### **3.1.7.1. Departmental Directorate of Planning and Development for Atlantic/Littoral**

The Departmental Direction of Planning and Development is a territorial division of the Ministry of Planning and Development. It is placed under the authority of the Secretary General of the Ministry of Planning and Development.

In the department, the Departmental Director is placed under the authority of the Departmental Prefect and its missions are to:

- monitor and evaluate the implementation of development projects and programs falling within the framework of the strategic development orientations, the growth strategy for poverty reduction, sustainable development objectives, etc., at the level of the department in collaboration with the General Secretariat of the Presidency of the Republic and the sectoral ministries concerned;
- assist prefects in monitoring and evaluating the implementation of national development policies and programs in their areas of competence;
- assist, at the technical level, the prefects in the elaboration of strategies, plans and development programs;
- provide technical assistance to mayors in the elaboration, implementation and monitoring-evaluation of their development plans and programs;
- provide technical support to local authorities in mobilizing resources for development, through consultations with development partners.

#### **3.1.7.2. Development Authority of the Glo-Djigbe Perimeter**

The perimeter of Glo-Djigbe was identified as early as 1974 by the Beninese authorities in order to establish a new airport there. To manage the implementation of this Project, the Government of Benin created the Glo-Djigbe Perimeter Development Authority (ADPG) by Decree No. 2002-568 of 31 December 2002.

The ADPG's area of intervention includes the Glo-Djigbe airport with a surface area of 1,600 ha and an additional area dedicated to agro-industry, logistics, trade and services, totalling 3,068 ha.

Thus, ADPG's main mission is to promote the economic development of this area. To this end, it oversees the following missions:

- bring to a successful conclusion the expropriation and compensation dossier for the persons affected by the project;
- draw up and enforce the development plan for the perimeter;
- identify and monitor the actions for the commissioning of the perimeter;
- organise and ensure the industrial and commercial exploitation of the perimeter.

The ADPG is responsible for ensuring that security conditions are met within the perimeter surrounding the airport so that the airport can operate in the best possible conditions. As such, it is a central stakeholder in the Project and will need to be kept informed of its progress.



### 3.1.8. Ministry of the Interior and Public Security

The Ministry of the Interior and Public Security is responsible for the development and implementation of State policy on security, civil protection and civil liberties. As part of its public security remit, the Ministry of the Interior is responsible for:

- public order, including the internal and external security of the State;
- taking all measures to ensure the prevention, investigation and punishment of all acts likely to disturb public order.

As part of its powers relating to the protection of civil liberties, the Ministry of the Interior and Public Security is responsible for:

- taking any act regulating the civil life of populations, the movement of persons and goods in accordance with the laws and conventions in force;
- ensuring the enjoyment of civil liberties.

The Ministry of the Interior and Public Security is responsible for civil protection and has to:

- prepare and implement civil protection and defence;
- ensure throughout the national territory the protection of persons and property, the security of installations of general interest and the natural resources of the nation in liaison with the other Ministerial Departments concerned.

For the accomplishment of its mission of internal security and civil protection, the Ministry of the Interior and Public Security can rely on:

- the Departmental Directorate of the Republican Police;
- the Republican Police, of which it is the supervisory authority, located in the municipalities of Tori-Bossito and Ze;
- the National Fire Brigade Group (GNSP), whose personnel are at his disposal for employment. The GNSP has no branches in the municipalities of Tori-Bossito and Ze. Nevertheless, the GNSP of Abomey Calavi will be in charge of intervening in case of need.

Within the framework of the Project, the safety of persons and property on the one hand and the implementation of emergency plans on the Project site on the other hand are the responsibility of the Republican Police and the National Fire Brigade.

### 3.1.9. Ministry of Tourism, Culture and Arts

The main law governing cultural heritage in Benin is Law n°2007-20 of 23 August 2007 on the protection of cultural heritage and natural heritage in the Republic of Benin. Cultural heritage protection is entrusted in the country to the Ministry of Tourism, Culture and Arts which is responsible for its management, protection and safeguard in coordination with the National commission on the protection of cultural heritage. The Ministry is represented at the department level by the Departmental Directorate for culture, leisure and sports.

The law classifies all the products of archeological investigations whether legal or illegal (art. 2) as natural heritage. It requires for any archaeological investigation to obtain a search authorization from the ministry. Once the authorization is approved, the archaeologist must submit a report on his works within 2 months to the Ministry. Any finding must be protected and reported to the departmental authorities and to the Ministry.

If during works, any archaeological assets are discovered, the Ministry and departmental authorities have to be informed and they must notify within 30 days the archaeologist and the owner of the land where the artefact was found about the suspension of works and the safeguard measures to be deployed.

### **3.1.10. Ministry of Decentralization and Local Governance**

The Ministry of Decentralization and Local Governance is responsible for defining, implementing and monitoring-evaluating State policy on decentralization, deconcentration, local governance and grassroots development, in accordance with the laws and rules in force in the Republic of Benin and the Government's development visions and policy. It is responsible for:

- coordinating the implementation of the territorial administration reform;
- implement the national policy of decentralization and deconcentration;
- to ensure the administration of administrative districts and the supervision of decentralized communities;
- to ensure the quality of governance in the conduct of local affairs;
- to ensure the quality of local public service provision to the population in collaboration with other ministries.

The Atlantic Prefecture, the municipalities of Tori-Bossito and Ze, as well as their structures among the population, will play an important role in managing the problems of the community when the State proceeds with expropriation for the release of companies, be it in the phase of allocation and acquisition of the estate, the dissemination of information about the persons affected by the Project, or possible contestation at the level of the beneficiaries.

#### **3.1.10.1. Prefecture**

The Prefecture is the guarantor of the application of national guidelines by the municipalities that are part of its department. The Prefect is thus the representative of each minister taken individually and of the Government taken collectively. The Prefect is therefore responsible for the implementation of all environmental, land, security and other issues at the decentralized level of the State.

The prefecture is organized into departments, whose activities are coordinated by a Secretary General of the Department. The important services related to the Project are:

- The General Affairs Department, which deals with matters relating to general administration, the field, management and staff training.
- The department of planning and land use planning which deals with matters relating to statistics and the economy; the preparation and execution of the departmental development plan; the coordination of proposals for communal land use plans in the department and the monitoring of their implementation; the coordination of local development; and the preparation and implementation of departmental projects.

The Prefecture that will host the Project is the prefecture of Atlantic/Littoral Department.

### **3.1.10.2. Municipality**

The municipality implements its own environmental and natural resource management policy in accordance with national laws and guidelines. It is responsible for spatial planning and environmental management at the local level. The law gives it the privilege of giving its opinion before carrying out any action within its territory of competence. It applies the national texts in its territory of competence to all actors and in all required situations.

The laws on decentralization (Law No. 97-029 of 15 January 1999) grant municipalities powers as decentralized local authorities in environmental matters. Together with the State and other local authorities, they contribute to the administration and planning of the territory, to economic, social, health, cultural and scientific development, as well as to environmental protection and the improvement of the living environment.

In accordance with the provisions of Articles 84 to 87 of Section 1, and Chapter III, the municipality draws up and adopts its Communal Development Plan (PDC). It ensures its implementation in harmony with national guidelines with a view to ensuring the best living conditions for the entire population. Within this framework, it draws up and issues, among others, the following documents:

- the economic and social development plan;
- the rules relating to the use and allocation of land;
- the detailed urban development and subdivision plan;
- housing and building permits.

It also ensures the permanent control of the conformity of the realizations and constructions with the regulations in force.

It participates in the drafting of the PDC concerning it, as well as on projects concerning regional or national public investments to be carried out on its territory.

The municipality initiates the acts related to the development of infrastructure and equipment that are part of its heritage as well as the actions related to their management and maintenance. It is responsible for the urbanization of its territory.

In accordance with the provisions of Articles 92, 94 and 96, the municipality regulates the transport of goods and persons within its territorial jurisdiction. It ensures the protection of natural resources, in particular forests, soil, fauna, water resources and water tables and contributes to their better use.

It shall give its opinion whenever the creation of any project likely to harm the environment on its territory is envisaged. It takes into consideration the protection of agricultural land, pastures, green spaces, the water table, surface water bodies and streams in the implementation of various public or private projects.

The municipalities that will host the Project on their territory are the municipality of Ze and the municipality of Tori-Bossito. Each of them has a PDC. The PDC of the municipality of Ze was published in June 2019 and covers the period from 2019 to 2023. The PDC of the municipality of Tori-Bossito was published in August 2018 and covers the same period (cf. § 6.5.2.2).

### **3.1.11. Other actors involved in the implementation of the Project**

#### **3.1.11.1. National Agency for Domain and Land**

Under the supervision of the Ministry of Economy and Finance, the National Agency for Domain and Land (ANDF) was created in 2015 by Decree No. 2015-010 of January 29, 2015 on the attributions,

organization and functioning of the ANDF. The ANDF is a public establishment of a technical and scientific nature whose mission is to secure and coordinate land and state management at the national level.

The ANDF is responsible for implementing the policies, strategies and programs of the Beninese State in the area of land and State property. In accordance with the legislation ( Law No. 2013-01 of 14 August 2013 on the Land and State Land Code), the objectives of this agency are to ensure equitable access to land through land registration, investment security, effective management of land conflicts, the process of expropriation for public utility, in order to contribute to poverty reduction, the consolidation of social peace and the achievement of integrated and sustainable development.

The ANDF has communal offices throughout the country. These offices, acting as a one-stop shop for land, are a major lever for operationalizing the ongoing reform to facilitate access to land in rural areas where customary law still prevails.

As part of the GDIZ Project, ANDF will be a member of the Interministerial Commission in charge of the expropriation procedure. This commission will oversee the expropriation procedure and the compensation of persons affected by GDIZ Project but also of SEZs as a whole.

#### **3.1.11.2. National Water Company of Benin**

Created in 2003 by decree n°2003-203 of 12 June 2003, following the separation of the 2 water and energy activities of the former Benin Electricity and Water Company (SBEE), the National Water Company of Benin (SONEB) is a one-man public limited company of an industrial and commercial nature which operates in the field of drinking water. Its purpose is the abstraction, transfer, treatment and distribution of drinking water as well as the disposal of wastewater. Its activities extend over the entire national territory.

SONEB is placed under the supervision of the Ministry of Energy, Oil and Mining Research, Water and Development of Renewable Energies.

The company is endowed with legal personality and financial autonomy. It carries out its activities in accordance with its statutes and laws as well as the regulations of the Uniform Act of the Organization for the Harmonization of Business Law in Africa relating to the law of commercial companies and economic interest groups.

Within the framework of the GDIZ Project, SONEB will intervene on the water access and sanitation aspects of the Project.

#### **3.1.11.3. Beninese Electric Power Company**

The Beninese Electric Power Company (SBEE) is a state-owned industrial and commercial company with legal personality. It is governed by the provisions of Law No. 88-005 of 26 May 1988 on the organisation and operation of public and semi-public enterprises in Benin.

SBEE is placed under the supervision of the Ministry of Energy, Petroleum and Mining Research, Water and Development of Renewable Energies and operates in accordance with the laws and customs governing the operation of private companies.

Within the framework of the GDIZ Project, SBEE will intervene on the electricity supply aspect of the Project.

#### **3.1.11.4. National Civil Aviation Agency**

The National Civil Aviation Agency (ANAC) is a public establishment of administrative and technical nature created in the Republic of Benin by decree n°2004-598 of 29 October 2004, replacing the Civil Aviation Directorate. It is placed under the supervision of the Ministry of Infrastructure and Transport. It is endowed with a financial autonomy strictly independent of the structures it controls, on behalf of the State.

Within the framework of this Project, ANAC is in charge of the environmental assessment procedure of the Glo-Djigbe International Airport and will intervene with ARISE on the management and monitoring of cumulative impacts.

### **3.2. National policy and legal framework relevant to the Project**

#### **3.2.1. Constitution of the Republic of Benin**

The Constitution of Benin gives a prominent place to the environment, through article 27, which states that "everyone has the right to a healthy, satisfactory and sustainable environment and has the duty to defend it. The State shall ensure the protection of the environment".

Law No. 90-032 of 11 December 1990 on the Constitution of the Republic of Benin, as amended by Law No. 2019-40 of 7 November 2019, lays down other principles relating to the environment and the living conditions of citizens. These principles are set out in the following articles:

- Art.8: The State shall ensure that these citizens have equal access to health, education, culture, information, vocational training and employment;
- Art.22: Everyone has the right to property. No one may be deprived of his property except in the public interest and in return for fair and prior compensation;
- Art.74: High treason is defined as the President of the Republic having violated his oath, being recognized as the author, co-author or accomplice of serious and characterized violations of human rights, of transfer of part of the national territory or of an act that is detrimental to the maintenance of a healthy, satisfactory, sustainable and favourable environment for development;
- Art.98: Rules concerning: the protection of the environment and the conservation of natural resources fall within the scope of the law.

#### **3.2.2. Benin's environmental policy**

Following the 1990 National Conference, which marked the return to pluralist democracy and the market economy, a clear orientation in environmental management was adopted. This can be seen in:

- the enshrinement of the principle of environmental protection and management in constitutional law;
- the institutionalisation of a Ministry of the Environment (since 1990) and its technical structures;
- the adoption of the Environmental Action Plan (1993);
- the creation of the Benin Environment Agency (1995);
- the adoption of the National Agenda 21 (1997).

The Environmental Action Plan (EAP) is the framework document for environmental management in the Republic of Benin. It comprises 7 sub-programs planned over an initial horizon of 15 years and whose global objectives concern:

- national capacity building;
- conservation and sustainable use of biological diversity and natural resources;
- improvement of the living environment of populations in both rural and urban areas;
- improved environmental decision-making and good governance.

It was revised in 2001 after 5 years of implementation, to take into account new issues such as air pollution from transport in urban areas. The various objectives of the EAP remain the environmental benchmarks for any sectoral policy, program or environmental support program at national and local levels.

Moreover, the Growth Strategy Paper for Poverty Reduction and the Government Action Program (GAP) incorporates the goal and all the specific objectives of the National Environmental Management Program, thus demonstrating Benin's political will to make the environment one of the pillars of sustainable development.

Several other actions complement the political efforts mentioned and make systematic consideration of the environment in development actions. Among others:

- adoption of the National Biodiversity Management Strategy and Action Plan;
- adoption of the National Action Plan to Combat Desertification;
- adoption of the National Strategy to Combat Air Pollution;
- preparation of the Integrated Water Resources Management (IWRM) strategy;
- preparation of the National Wetland Management Strategy;
- elaboration of a National Plan for Pollution Control.

### **3.2.3. Framework law on the environment**

The Environment Framework Law No. 98-030 of 12 February 1999 includes provisions on the clarification of concepts, penalties, protection and development of receiving environments, protection and development of the natural and human environment, pollution and nuisances, impact studies, public hearings on the environment, emergency plans and incentives. This law constitutes the basic text of the national environmental policy, in that it covers all aspects from the identification of sources of pollution to their control and repression, including environmental assessments.

The main principles of environmental consideration are defined in the Act through the following articles:

- Article 3-c "The protection and development of the environment must be an integral part of the economic and social development plan and the strategy for its implementation. This principle requires that environmental issues be taken into account in the implementation of development activities";
- Article 3-d. "The various social groups must be involved at all levels in the formulation and implementation of national environmental policy; this principle is crucial in the fight against poverty and promotes the country's development";
- Article 3-f. "any act prejudicial to the protection of the environment entails the direct or indirect responsibility of its author, who must ensure its reparation".

These 3 principles refer respectively to (i) the taking into account of environmental concerns during the implementation of projects through environmental assessment tools, (ii) public participation during the environmental assessment process and (iii) the Polluter Pays Principle "aiming at the assumption of the costs/costs that result from measures to prevent, reduce and control pollution by the polluter". It is a principle derived from the ethics of responsibility, which consists in making each economic actor take into account the negative externalities of his activity.

Two key provisions of this law make environmental impact assessments mandatory in Benin:

- Article 88: "No one may undertake developments, operations, installations, plans, projects and programs or the construction of works without following the environmental impact study procedure when the latter is required by laws and regulations". This article therefore makes environmental impact assessment (EIA) mandatory;
- Article 89: «any person who intends to undertake the carrying out of one of the activities referred to in Article 88 must file a written notice with the Minister requesting the issuance of an Environmental Compliance Certificate (ECC) and describing the general nature of the activity. This environmental compliance certificate is one of the documents to be submitted to the regulatory authority for a final decision on the proposed activity ».

### **3.2.4. Environmental Assessment Procedure**

#### **3.2.4.1. Decrees relating to the environmental assessment procedure in Benin**

In 2017, a new Order in Council was issued to replace the Environmental Assessment Orders dating from 2001. It is Decree No. 2017-332 of 6 July 2017 on the organization of environmental assessment procedures in the Republic of Benin. This decree brings together most of the information contained in the previous decrees and thus confirms the robustness of the environmental assessment procedure in Benin.

To this decree were added decrees organizing the environmental control by the administration:

- decree n°2001-096 of 20 February 2001 on the creation, powers, organization and operation of the environmental police;
- decree n°2001-095 of 20 February 2001 on the creation, powers, organization and operation of environmental units in the Republic of Benin.

These decrees were supplemented in 2005 by Decree n°2005-437 on the organization of the environmental inspection procedure in the Republic of Benin.



### 3.2.4.2. Conduct of the environmental and social impact assessment procedure

The diagram below shows how the ESIA process unfolds in Benin.

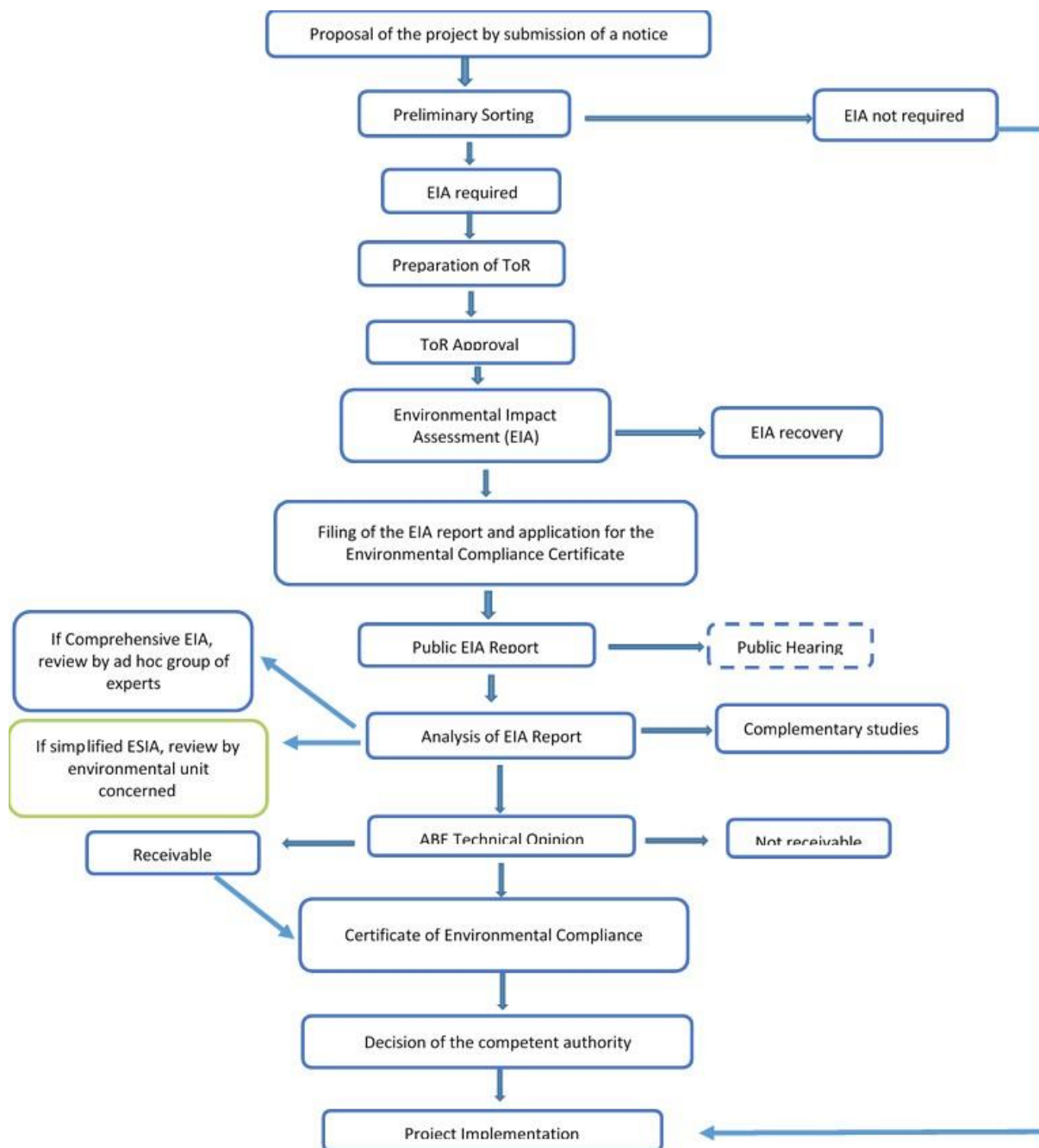


Figure 7 : Administrative process of carrying out an environmental impact study

### 3.2.5. Environmental protection measures

#### 3.2.5.1. Sectoral decrees on the environment

In addition to the decrees governing environmental assessment and the monitoring of its proper implementation, Benin has gradually acquired tools to regulate the management of certain sources of pollution, improve safety conditions in establishments at risk and set normative thresholds to ensure the maintenance of a healthy environment for the population.

These decrees are presented in the table below and their content is detailed in the section on standards applicable to the Project.

**Table 1 : Sectoral decrees on the environment**

Title	Content
<b>Decree n°2001-094 of 20 February 2001</b>	Setting drinking water quality standards in the Republic of Benin
<b>Decree n°2001-109 of 4 April 2001</b>	Establishing wastewater quality standards in the Republic of Benin
<b>Decree n°2001-110 of 4 April 2001</b>	Setting air quality standards in the Republic of Benin
<b>Decree n°2001-294 of 8 August 2001</b>	Carrying the noise regulation in the Republic of Benin
<b>Decree n°2003-330 of 27 August 2003</b>	Carrying out waste oil management in the Republic of Benin.
<b>Decree n°2003-332 of 27 August 2003</b>	Carrying solid waste management in the Republic of Benin.
<b>Decree n°2006-775 of 31 December 2006</b>	Carrying general safety rules in establishments at risk in the Republic of Benin.

(Source: legislation of the Republic of Benin)

#### 3.2.5.2. Regulations concerning protected areas in Benin

It mainly concerns a decree, Decree n°2017- 331 of 06 July 2017 defining the categorization of the Protected Areas of the Republic of Benin according to the nomenclature of the World Conservation Union (IUCN).

According to this decree, the categorization of the Protected Areas of the Republic of Benin makes it possible to integrate areas other than classified forests and national parks, in this case sacred and communal forests and marine areas, into the national system of protected areas. It allows the evaluation of commitments and progress according to international standards and facilitates access to international opportunities for the conservation of Protected Areas for a better preservation of the country's biological resources.

#### 3.2.5.3. Protection of fauna and flora and list of protected species

Benin ensures the protection of the most endangered species of fauna and flora through 2 pieces of legislation:

- Law n°93-009 of 2 July 1993 on the forestry regime;
- law n°2002-16 of 18 October 2004 on the wildlife regime.

The management, protection and exploitation of forest and related products are subject to the provisions of law n°93-009 of 2 July 1993 on the forest regime in the Republic of Benin. Article 36 of this Act refers to the following as protected plant species:

- 1) slow-growing forest species for scientific or medicinal purposes;
- 2) all tree species planted by man;
- 3) all forest species classified as such by decree issued by the Council of Ministers.

Decree n°96-271 of 2 July 1996 implementing the forestry regime in Benin thus presents the complete list of protected flora species. This decree is presented in Annex III of the report.

Article 2 of Law n°2002-16 of 18 October 2004 on the regime of fauna in the Republic of Benin stipulates that fauna constitutes an essential element of the nation's biological heritage whose conservation is guaranteed by the State. Every citizen has the duty to respect and ensure its protection. Article 31 of the same Act classifies wild animals in 3 categories:

- fully protected species (category A);
- partially protected species (category B);
- other non-protected species (category C).

Decree n°2011-394 of 28 May 2011 establishing the modalities of conservation, development and sustainable management of wildlife and its habitats in the Republic of Benin presents the species of category A in Annex I, category B in Annex II and category C in Annex III. The complete list of species by category (A, B and C) is presented in Annex III of this report.

### **3.2.5.4. Water management**

Law n°2010-44 of 21 October 2010 on water management in the Republic of Benin advocates Integrated Water Resources Management (IWRM) as the basic principle for water management in Benin. All developments, works, installations and activities carried out in inland waters by a natural or legal person, public or private, and which may cause water abstraction or chronic or episodic discharge or dumping, must ensure "a balanced use, equitable distribution and sustainable exploitation of the available resource (art. 3).

Article 14 prohibits the pollution of water resources and stipulates that "when the activities of natural or legal persons are likely to cause or aggravate water pollution or the degradation of the aquatic environment, they shall contribute to the financing of the measures that the State and local authorities must take to combat such pollution, to compensate for its effects and to ensure the conservation of aquatic ecosystems".

Article 40 makes installations and works that would result in the abstraction of surface or ground water or in discharges or deposits in nature subject to authorisation or declaration.

Section 48 states that "in the case of groundwater withdrawals, protective measures...shall include the establishment of an immediate protective perimeter around the point of withdrawal". Within this perimeter, any activity that could lead to pollution of the groundwater is prohibited (deposits of waste, oil and substances presenting toxic risks, in particular chemicals).

Finally, Article 72 provides a framework for the punishment of offenders who throw, dump or allow substances that have harmful effects on human health or ecological biodiversity to flow into surface or ground water. If convicted, offenders are liable to fines and imprisonment.

The Project, insofar as it is based on the drilling of boreholes for its water supply and will generate wastewater discharges, will have to adhere to this vision and ensure compliance with its provisions

during the construction phase but also during the operation phase. In particular, it will have to ensure that its withdrawals do not reduce the resource available to local residents and that its discharges do not cause pollution of watercourses or the water table.

### **3.2.6. Laws and decrees governing the social aspects of the Project**

#### **3.2.6.1. Hygiene, health and safety at work**

The law n°87-015 of 21 September 1987 on the Public Hygiene Code organizes, among other things, the hygiene of foodstuffs, that of industrial installations and that relating to animal health controls. It establishes the health police, whose officers are responsible, among other things, for investigating and reporting breaches of hygiene legislation.

In addition, the Labour Code in force in Benin (law n°98-004 of 27 January 1998 on the Labour Code) includes a chapter on occupational safety and health (chapter 4). Article 182 of this chapter stipulates that, in order to protect the life and health of workers, the employer is required to take all appropriate measures that are suited to the operating conditions of the enterprise. These measures cover the workplace, staff training, first aid, alcohol consumption or the existence of a right of withdrawal in the event of imminent danger to staff.

The provisions relating to the protection and healthiness of the workplace (in particular with regard to temperature, lighting, ventilation or airing, drinking water, changing rooms, toilets, evacuation of dust, gases and vapours, precautions to be taken against fire, radiation, noise and vibration) and which are applicable to all establishments and enterprises subject to the code are made by ministerial order.

Section 187 requires that a Health and Safety Committee be mandatorily established in every establishment subject to this Code.

Chapter 6 governs the creation of commissaries in the workplace. Finally, provisions for the settlement of individual and collective labour disputes are set out in Title 6 of the law.

The Labour Code is supplemented by a text on the protection of the health and safety of workers: Order n°022/MFPTRA/DC/SGM/DT/SST on general occupational health and safety measures. This decree thus specifies which devices or arrangements must be made to ensure that workplaces comply with the standards set out. The topics of ventilation, lighting, cleanliness, toilets, etc. are addressed.

This text was supplemented in 2006 by Order n°126/MFPTRA/DC/SGM/DGT/DST of 27 March 2006 regulating noise in the workplace.

The implementation of the Project works will require the use of labour, which will have to be managed in accordance with the Public Health Code, the Labour Code and the above-mentioned texts.

#### **3.2.6.2. Labour law**

##### **3.2.6.2.1. Labour Code**

The Labour Code of Benin (Act n°98-004 of 27 January 1998 on the Labour Code) contains a set of provisions governing labour law in the country. Among these provisions, the most important are those related to:

- form of employment contract;
- trade unions;
- collective agreements and establishment agreements;
- working hours and rest periods;

- health and safety at work;
- settlement of workplace disputes.

In accordance with the law in the Republic of Benin, any person who has undertaken to place his or her professional activity, in return for remuneration, under the direction and authority of a natural or legal person, public or private, is considered to be a worker within the meaning of the Labour Code, regardless of sex or nationality.

The legal working time may not exceed 40 hours per week. The actual daily working time per worker may not exceed 8 hours, unless an exception is laid down by a decree issued by the Council of Ministers or by collective agreements.

Overtime shall be paid at an increased rate fixed by means of a collective agreement or convention, which may not be less than the following percentages:

- Overtime during the day:
  - 12% of the hourly rate from the 41st to the 48th hour;
  - 35% of the hourly rate after the 48th hour;
  - 50% of the hourly rate on Sundays and holidays.
- Overtime at night:
  - 50% of weekday hourly rate;
  - 100% of the hourly rate on Sundays and holidays.

Overtime at night is defined as overtime worked between 9 p.m. and 5 a.m.

The Labour Code also includes provisions on the employment of disabled persons (arts. 31, 32 and 33). These provisions prohibit discrimination against such persons in hiring and offer tax benefits to companies offering them jobs.

The Code also regulates child labour in its chapter 2 on special provisions for the employment of women and children. Thus, the minimum age for work is 14 in a context where compulsory education is limited to primary school.

The minimum age for hazardous work is 18. Decree n°2011-029 of January 2011 sets out the various hazardous activities and includes 22 occupations (including in mines and quarries, domestic services and agriculture) and 74 hazardous activities. The decree also prohibits workers under 16 years of age from performing certain types of work, including transporting heavy loads, working in slaughterhouses, and operating certain types of machinery.

Night work is prohibited for young workers under 18 years of age, however, derogations are granted by decree of the Council of Ministers, after consultation with the National Labour Council. The daily rest period for young workers under the age of 18 must be at least 12 consecutive hours, including the night period. Any discrimination against the young worker (14 years and over) is prohibited.

The law n°2006-04 on conditions for the movement of minors and the suppression of child trafficking in the Republic of Benin criminalizes all forms of child trafficking and provides for penalties of 10 to 20 years' imprisonment. However, for the exploitation of child labour, penalties are provided for by law. The exploitation of children includes all forms of slavery and similar practices, including debt bondage, serfdom and forced or compulsory labour to employ children in work which, by its nature or the conditions under which it is carried out, is likely to harm the health, safety and morals of the child.

Abuse includes the weight of the work in relation to the child's age, the total number of hours of work, the insufficiency or absence of remuneration or the hindrance of work in relation to the child's access to education, physical, mental, moral, social and spiritual development.

#### **3.2.6.2.2. General Collective Labour Agreement**

Another important text provides a framework for labour law. This is the General Collective Labour Agreement applicable to companies in the private and parapublic sectors. The convention in force dates from 30 December 2005. It covers issues relating to:

- the form of the employment contract;
- compensation for the sick worker;
- termination of the employment contract, dismissal;
- the exercise of trade union rights;
- working hours and paid holidays;
- remuneration;
- health and safety at work.

This convention lays down the principles of equal pay in its article 61: "For work of equal value, pay shall be equal for all workers, whatever their origin, sex, age, status or religion, under the conditions laid down in this convention".

This Convention also stipulates that "no wage may be lower than the guaranteed minimum wage (SMIG) set by decree". The last decree published, Decree n°2014-292 of 24 April 2014 raising the guaranteed minimum interprofessional wage (SMIG), raised the SMIG by 26.48%, i.e. from 31,625 CFA francs to 40,000 CFA francs with effect from 1 May 2014. Since that date, no new increase in the SMIG has been made.

Article 72 stipulates that employees must take various medical check-ups, including a check-up at the time of hiring and a periodic check-up.

Mention should also be made of law n°2017-05 of 29 August 2017, establishing the conditions and procedure for recruitment, placement of labour and termination of employment contracts in the Republic of Benin. This law lays down the conditions and procedure for recruitment, placement of labour and termination of employment contracts. It regulates relations between employers and workers carrying out their professional activities in the Republic of Benin.

#### **3.2.6.3. Cultural heritage**

The law n°2007-20 of 23 August 2007 on the protection of cultural heritage and natural heritage of a cultural nature in the Republic of Benin aims to define, inventory and classify cultural heritage and natural heritage of a cultural nature in order to protect it against unlawful destruction, alteration, transformation, excavation, alienation, export, import and international transfer.

It applies to intangible, movable and immovable cultural property, whether public or private, whose protection is in the public interest.



#### 3.2.6.4. HIV/AIDS

Benin has 3 instruments at its disposal to combat HIV/AIDS:

- law on the prevention, care and control of HIV/AIDS (law n°2005-31 of 5 April 2006);
- a policy, standards and procedures for the care of persons living with HIV in Benin (2012);
- a national council to combat AIDS, tuberculosis, malaria, hepatitis, sexually transmitted infections and epidemics (CNLS-TP) was set up in 2019 and given responsibility for combating these diseases.

#### 3.2.6.5. Equality between men and women

Violence against women is a crucial development issue that affects women's dignity. Women, being part of vulnerable groups, are subjected to frequent violations of their rights in Benin as in other countries.

Faced with this situation, the Government of the Republic of Benin has promulgated Act n°2011-26 of 9 January 2012 on the prevention and punishment of violence against women.

This law constitutes a mechanism for the development of women, a significant step forward in the legal protection of beninese women and a better appreciation of the principle of gender equality. It also makes it possible to punish violations of women's rights and to combat discrimination, except positive discrimination. Article 5 of the Act stipulates that « the fight for equality between men and women is a national priority ».

The article 17 of this law confers on women « the enjoyment of their rights to physical and moral integrity, liberty, security, equality and non-discrimination on the grounds of sex ».

In 2008, the Government of Benin also adopted a National Gender Promotion Policy to correct gender imbalances. This will serve as a reference framework for strategies or actions aimed at reducing or even eliminating disparities between men and women by 2025.

The Project will therefore have to comply with these objectives of non-discrimination of women and equal treatment of women.

#### 3.2.6.6. Land management

##### 3.2.6.6.1. Constitutional provisions

Article 22 of the Constitution of 11 December 1990 states that "everyone has the right to property. No one may be deprived of his or her property except in the public interest and in return for fair and prior compensation". This article of the Constitution, which affirms the right to land ownership, has enabled the Government to embark on a wide-ranging land reform program.

While, according to tradition, land belongs to the first occupants, today, title deeds duly registered by the competent services are required for the acquisition and possession of land. Indeed, in rural areas, most land is governed by the customary law regime characterized by orality. Ownership is acquired by continuous possession, inheritance, inter vivos gift or by contract.

In urban areas with housing estates, most individuals hold, in addition to private agreements for the sale of land, a precarious and revocable "residence permit" within the meaning of Act n°60-20 of 13 July 1960 establishing the system of residence permits in Benin.

The cohabitation of customary law with modern law creates persistent confusion and is a source of conflict.

#### 3.2.6.6.2. Management of land property

The new land tenure system elevates rights held on land under customary status to the status of "presumed rights". In particular, Article 112 of Law n°2017-15 amending and supplementing Law n°2013-01 of 14 August 2013 on the Land and State Land Code (CFD) in the Republic of Benin explains that « only the land title confers full ownership in the Republic of Benin. All the attributes of the right of ownership are attached to it. All land not covered by a land title is under presumed rights. The State issues land titles to holders of a permit to live in a building belonging to it under the conditions laid down by decree of the Council of Ministers ».

According to article 4 of the CFD, the system of confirmation of land rights "governs all rural, peri-urban and urban land and is based on a contradictory procedure for the confirmation of land rights". The contradictory nature of this confirmation is based on the summoning of neighbours, neighbours and any other rightful claimant or successor in title for the disclosure of their rights, claims or the formation of opposition.

Article 39 of the CFD defines the various property rights, including:

- property;
- usufruct;
- right of use, dwelling and surface area;
- easements;
- mortgages;
- privileges;
- leases entailing rights in rem in immovable property.

#### 3.2.6.6.3. Land and State Code and its importance

By law n°2017-15 amending and supplementing law n°2013-01 of 14 August 2013 on the Land and State Land Code in the Republic of Benin, Benin opted for a comprehensive reform, including the adoption of a new land tenure system known as the system of confirmation of land rights. This new regime harmonizes the legal framework for land tenure by putting an end to the legal dualism that has long characterized the land tenure system in Benin.

The revised Land and State Land Code sets out new benchmarks and parameters for land management. In particular, it introduces new legal provisions relating to access to property, procedures and time limits for land transactions, the procedure for confirming rights and expropriation for reasons of public utility.

According to Article 5, the State therefore owns the national territory and is responsible for its preservation and development, guaranteeing the right of ownership to persons or communities having acquired private law according to laws and regulations or customary rules. The State and territorial communities have the right to expropriate any holder of land rights for reasons of public utility in exchange for fair and prior compensation.

In its principles, this law is egalitarian in terms of gender. In its article 6, it intends to "ensure respect for the equality of men and women in access to land" and in its article 10, it confirms the provisions on inheritance set out in the Personal and Family Code, which guarantees gender equality in inheritance of all property, including land property.

Lastly, article 526 of the law refers to the economic, social and cultural rights to be respected in the implementation of externally funded development projects.

#### 3.2.6.6.4. Expropriation in the public interest

Expropriation is the procedure by which a legal entity under public law (State, local authority) can oblige a private person, individual or company, to cede its real estate rights to it in return for "fair and prior" compensation.

The Land and State Land Code appears to be the legal framework of reference for expropriation in the public interest, an administrative procedure organised by Articles 211 and following of the Code.

In accordance with the provisions of article 211 of the said code, « the expropriation of buildings, in whole or in part, or of real property rights for reasons of public utility shall be carried out, failing an amicable agreement, by a court decision and against payment of fair and prior compensation ».

Nevertheless, no compensation is provided for persons who settle less than 100 metres from the sea shore, nor at the edge of watercourses between 0 and 25 metres from watercourses. These areas are in the natural public domain of the State.

In the Land and State Code (article 215), the cases in which expropriation for public utility is used or pronounced are specified, including:

- the construction of roads, railways, ports, airports, schools and universities;
- military works;
- urban and rural planning and development works;
- research or mining works;
- works for the protection of the environment, hygiene and public health;
- the development and distribution of water and energy, the installation of utilities, the creation or maintenance.

As the Project falls under the Government Action Program (GAP), it is part of general investment works and therefore falls under the regime of expropriation in the public interest.

Details of the expropriation procedure are set out in the Code in Articles 217 to 237.

The provisions relating to expropriation have also been clarified by Decree n°2015-013 of 29 January 2015 on the composition and standard operation of the commodo and incommodo commissions of inquiry and compensation in matters of expropriation in the public interest.

#### 3.2.7. Laws and decrees relating to the industry and trade sector

Two laws also apply to the Project in its industrial context:

- Law n°2017-07 of 19 June 2017 establishing the regime of Special Economic Zones in the Republic of Benin: it governs the creation, promotion, operation, administration, maintenance and development of Special Economic Zones (SEZ) in Benin.
- Ordinance n°2008-06 of 05 November 2008 amending Articles 11 new, 33 new, 47-1 and 47-2 of Law n°90-002 of 09 May 1990 on the Investment Code, as amended by Ordinance n°2008-04 of 28 July 2008. This order offers national and foreign companies customs and tax advantages.

### **3.3. Main standards applicable to the Project**

#### **3.3.1. National standards**

##### **3.3.1.1. Water quality, drinking water and wastewater discharges**

Three texts provide a framework for the management of water resources in Benin.

###### **3.3.1.1.1. Standards for drinking water quality.**

Decree n°2001-094 of 20 February 2001 setting the quality standards for drinking water in the Republic of Benin lays down the standards for drinking water pursuant to the provisions of law n°98-030 of 12 February 1999 on the framework law on the environment in the Republic of Benin. This decree sets clear microbiological and physico-chemical standards. It requires operators of drinking water distribution systems to take samples at a defined frequency for parameter control purposes.

Table 1 Beninese standards for drinking water quality

Parameters	Unit	Values
<b>Physical parameters</b>		
Turbidity	UTB	5
pH	-	6,5 < pH < 8,5
Colour	UcV	15
Taste	-	Harmless
Hardness	mg/l	200
Conductivity	µS/cm	-
<b>Physico-chemical parameters</b>		
Iron	mg/l	
Magnesium	mg/l	50
Manganese	mg/l	0,1
Zinc	mg/l	3
Chloride	mg/l	250
Calcium	mg/l	100
Cyanide	mg/l	0,2
Fluorides	mg/l	1,5
Nitrates	mg/l	45
Nitrites	mg/l	3,2
Sulphates	mg/l	500
<b>Metals</b>		
Arsenic	mg/l	0,05
Barium	mg/l	1
Boron	mg/l	5
Cadmium	mg/l	0,005
Chromium	mg/l	0,05
Copper	mg/l	2
Mercury	mg/l	0,001
Nickel	mg/l	0,02
Lead	mg/l	0,05
Selenium	mg/l	0,01
<b>Organic parameters</b>		
Benzene	mg/l	0,01
Phenolic compounds	mg/l	0,002
<b>Biologic parameters</b>		
E. coli	Nb/100mL	0
Faecal streptococci	Nb/100mL	0
Total coliform	Nb/100mL	0

(Source: Decree n°2001-094 of 20 February 2001 setting the standards for drinking water quality, article 17)

As the Project provide for the distribution of drinking water, it is subject to this decree.

### 3.3.1.1.2. Wastewater quality standards

Decree n°2001-109 sets the quality standards for wastewater in the Republic of Benin, including industrial wastewater and domestic wastewater.

According to Article 4 of this decree, "the discharge of industrial wastewater into storm water drainage channels is prohibited". Any discharge of wastewater into a receiving environment is subject to a discharge permit, issued upon written request to the Minister in charge of the environment. The permit issued contains the following information:

- average and maximum allowable flows;
- average and maximum allowable contaminant concentrations and loadings;
- discharge compliance self-monitoring requirements.

Article 9 further requires that the points of release into the receiving environment be "as few as possible" and that each point be arranged to provide access to a point for sampling and measurement.

Standards are then set by industry type, and standards for conventional and non-conventional contaminants are also set. These are presented in the table below.

**Table 2 : Discharge standards for conventional and non-conventional contaminants in industrial wastewaters**

Physico-chemical parameters	Units	(A) Permitted daily average concentration		(B) Quantity of contaminant released
		If quantity released < B	If quantity released > B	
Conventional parameters				
DBO <sub>5</sub>	mg/l	100	30	30 kg/j
MES	mg/l	100	35	15 kg/j
DCO	mg/l	100	125	100 kg/j
Total oils and fats	mg/l	100	30	1 kg/j
PH	6< PH < 9 anytime			n/a
Temperature	°C	5°C higher than the temperature of the receiving waters		n/a
Unconventional parameters				
Phosphore <sup>(2)</sup>	mg/l	100	10	15 kg/j
Azote total (NTK) <sup>(2)</sup>	mg/l	200	30	50 kg/j

(Source: Decree n°2001-109 of 4 April 2001)

Finally, the release of toxic substances into the environment must not exceed concentrations above the thresholds set out in the table below.



**Table 3 : Concentration limits for toxic substances**

Parameters	Permitted Daily Average Concentration	Discharge Limit Quantity for Exemption
Sulfides	2.5 mg/l	50 g/j
Fluorides	4 mg/l	150 g/j
cyanides	1.0 mg/l	1 g/j
Metals:		
arsenic	0.5 mg/l	1 g/j
cadmium	1.0 mg/l	5 g/j
hexavalent chromium	0.1 mg/l	1 g/j
full chromium	2.5 mg/l	5 g/j
copper	2.5 mg/l	5 g/j
mercury	0.03 mg/l	0.1 g/j
nickel	2.5 mg/l	5 g/j
lead	1.0 mg/l	5 g/j
Zinc	5.0 mg/l	20 g/j
Phenolic compounds	1.0 mg/l	3 g/j
Total hydrocarbons	10 mg/l	100 g/j
Aromatic hydrocarbons Monocyclic (HAM)	0.5 mg/l	1 g/j
Total halogenated hydrocarbons	0.5 mg/l	1 g/j
Polycyclic aromatic hydrocarbons	0.5 mg/l	1 g/j
Polychlorinated biphenyls (PCBs)	0.15 mg/l	0.5 g/j
Other contaminants	5.0 mg/l	10 g/j
Inorganic (each)	5.0 mg/l	1 g/j

(Source: Decree n°2001-109 of 4 April 2001)

With regard to domestic waters, these "may be discharged into the natural environment only after having undergone appropriate treatment so as to avoid pollution of groundwater tables" (art. 18). Domestic water discharged must satisfy the following quality criteria:

- DB05 less than or equal to A 25 mg/l for a minimum percentage reduction of 70 to 90%;
- COD less than or equal to 125 mg/l for a minimum percentage reduction of 75%;
- TSS less than or equal to 35 mg/l for a minimum percentage of reduction of 90% in the case of an equivalent population greater than 100 and TSS less than or equal to 60 mg/l for a minimum percentage of reduction of 70%;
- a pH between 6 and 9;
- a maximum temperature 1°C higher than the temperature of the receiving waters.

The implementation of an individual domestic wastewater treatment system requires a permit from the Ministry of Health.

### 3.3.1.2. Air quality

Air quality in Benin is governed by Decree n°2001-110 of 4 April 2001 setting air quality standards. The decree includes ambient air quality standards applicable throughout the national territory (art. 3). It also sets standards for emissions from new or used light vehicles and trucks (art. 7), new or used heavy vehicles (art. 8), new or used motorcycles (art. 9) and establishments (stationary sources) (art. 17).

All these standards are presented in the tables below.

**Table 4 : Ambient air quality standard**

Pollutant	Duration of measurement period	Average value
Ozone (O <sub>3</sub> )	Average over 8 hours	0.08 ppm
Carbon monoxide (CO)	Average over 1 hour Average over 8 hours	40 mg/m <sup>3</sup> 10 mg/m <sup>3</sup>
Sulphur Dioxide (SO <sub>2</sub> )	Average over 1 hour 24-hour average Annual average	1300 µg/m <sup>3</sup> 200 µg/m <sup>3</sup> 80 µg/m <sup>3</sup>
Suspended particles (<10 microns)	24-hour average Annual average	230 µg/m <sup>3</sup> 50 µg/m <sup>3</sup>
Nitrogen Dioxide (NO <sub>2</sub> )	24-hour average Annual average	150 µg/m <sup>3</sup> 100 µg/m <sup>3</sup>
lead (Pb)	Annual average	2 µg/m <sup>3</sup>

(Source: Decree n°2001-110 of 4 April 2001, Article 3)

**Table 5 : Emission limit criteria for light-duty vehicles**

Years of application of the standards	Total distance travelled (or years of use)	Parameters				
		CO (g/km)	CO (%)	NO <sub>x</sub> (g/km)	COV (g/km)	Particles (g/km)
Until 2003	< 80 000 km (<5 ans)	2,1	2	0,25	0,15	0,12
	> 80 000 km (> 5 ans)	2,6	2	0,37	0,19	0,12
2004 and subsequent years	< 80 000 km (<5 ans)	1,1	1,5	0,13	0,08	0,08
	> 80 000 km (> 5 ans)	1,1	1,5	0,13	0,08	0,08

(Source: Decree n°2001-110 of 4 April 2001, Article 3)

**Table 6 Emission limit criteria for heavy-duty vehicles**

	Parameters (g/kwh)			
	CO	NO <sub>x</sub>	COV	Particles
Until 2010	20,8	6,7	1,7	0,34
2011 and subsequent years	20,8	5,4	1,7	0,13

(Source: Decree n°2001-110 of 4 April 2001, Article 8)

**Table 7 : Emission limit criteria for stationary sources**

Type of establishment	Parameter	Emission limit criterion
Cement plants (clinker grinding and formulation)	Particles	50 g/T of clinker
Combustion plants using hydrocarbons as fuel	Particles	85 mg/Mj
	NO <sub>x</sub>	325 ppm

(Source: Decree n°2001-110 of 4 April 2001, Article 17)

The Project, both in the construction and operational phases, will result in air emissions from both diffuse (light vehicles and construction machinery) and stationary sources. It will therefore have to comply with this decree.

### 3.3.1.3. Sound environment and noise

The control of noise pollution is carried by Decree n°2001-294 of 5 August 2001 regulating noise. This decree governs the permissible noise levels. This decree aims to ensure the control of the intensity of noise levels with the exception of noise from air and rail traffic which are governed by specific provisions relating to these sectors. The limit values authorised by the decree vary according to the type of zone and the time of day. As specified in Article 7 of the Decree, these noise levels must be measured outside the enclosures housing the emission sources.

**Table 8 : Noise levels to be respected per time slot**

Type of zone Time range	Class 1 Housing zone	Class 2 Trading zone	Class 3 Industrial zone
6 a.m. to 1 p.m.	50	55	70
1 p.m. to 3 p.m.	45	50	70
3 p.m. to 10 p.m.	50	55	70
10 p.m. to 6 a.m.	45	50	70

(Source: Decree n°2001-294 of 5 August 2001, Article 7)

The Project will cause noise nuisance that will have to comply with these thresholds.

### 3.3.2. IFC standards

IFC provides general standards to monitor ambient air quality, treated sanitary discharge waters and noise limits in its IFC Environmental, Health and Safety (EHS) Guidelines, IFC, 2007. It also provides industry sector guidelines on air emissions and effluents for various industrial activities such as food processing and textiles manufacturing.

### 3.3.2.1. Air quality

For ambient air quality, the standards have been edited by the World Health Organization (WHO)<sup>1</sup> and IFC refers to them. Each industry in GDIZ will have to refer to the IFC sectorial guidelines for its specific air emissions limits.

Table 9 : WHO ambient air quality guidelines\*

Substance	Averaging period	Guideline value in µg/m <sup>3</sup>
Sulfur dioxide (SO <sub>2</sub> )	24-hour	20
	10 minutes	500
Nitrogen dioxide (NO <sub>2</sub> )	1-year	40
	1-hour	200
Particulate Matter PM <sub>10</sub>	1-year	20
	24-hour	50
Particulate Matter PM <sub>2.5</sub>	1-year	10
	24-hour	25
Ozone	8-hour daily maximum	100

(Source: Environmental, Health and Safety (EHS) Guidelines, IFC, 2007)

### 3.3.2.2. Drinking-water quality

For drinking water, the standards have been edited by the World Health Organization (WHO)<sup>2</sup> and IFC refers to them. Each industry and common infrastructures in GDIZ will have to refer to the IFC sectorial guidelines for drinking water quality.

Table 10 WHO drinking water quality guidelines

Parameter	Unit	OMS 2017
<b>METAL</b>		
arsenic	µg/l	10
cadmium	µg/l	3
chromium	µg/l	50
copper	µg/l	2000
mercury	µg/l	6
lead	µg/l	10
nickel	µg/l	70
zinc	µg/l	-
Antimony	µg/l	20
Barium	µg/l	1300
Boron	µg/l	2400
Selenium	µg/l	40
Uranium	µg/l	30
<b>VOLATILE AROMATIC COMPOUNDS</b>		
benzene	µg/l	10
toluene	µg/l	700
ethylbenzene	µg/l	300
xylenes	µg/l	500
styrene	µg/l	20

<sup>1</sup> World Health Organization (WHO). Air Quality Guidelines Global Update, 2005

<sup>2</sup> World Health Organization (WHO). Drinking water quality Guidelines Global Update, 2017

Parameter	Unit	OMS 2017
1,2-dichlorobenzene	µg/l	1000
1,4-dichlorobenzene	µg/l	300
<b>POLYCYCLIC AROMATIC HYDROCARBONS</b>		
benzo(a)pyrene°	µg/l	0,7
<b>VOLATILE ORGANO-HALOGENATED COMPOUNDS</b>		
1,2-dichloroethane	µg/l	30
cis+trans1,2-dichlorethylene	µg/l	50
dichloromethane	µg/l	20
1,2-dichloropropane	µg/l	40
1,3-dichloropropene	µg/l	20
tetrachlorethylene	µg/l	40
tetrachloromethane	µg/l	4
trichlorethylene	µg/l	20
chloroform	µg/l	300
vinylchloride	µg/l	0,3
hexachlorobutadiene	µg/l	0,6
<b>OTHER PARAMETERS</b>		
Acrylamide	µg/l	0,5
Bromates	µg/l	10
Bromoform	µg/l	100
Epichlorydrin	µg/l	0,4
Fluorides	µg/l	1500
Nitrates	µg/l	50000
Nitrites	µg/l	3000
Totalmicrocystins	µg/l	1
Aldrin, dieldrin, heptachlor, hepta chlorepoxyde per individual substance	µg/l	0,03
Total pesticides	µg/l	-
Turbidity	NFU	-
Escheriachacoli	UFC/100ml	0
Enterococci	UFC/100ml	0

### 3.3.2.3. Treated sanitary sewage discharges

The proposed limits for treated sanitary sewage discharges are presented in the table below. Each industry in GDIZ will have to refer to them and to their industry sector guidelines for effluents limits (especially industrial wastewater).

**Table 11 : Treated sanitary sewage discharges limits**

Pollutants	Units	Guideline value
pH	pH	6 – 9
BOD	mg/l	30
COD	mg/l	125
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Oil and grease	mg/l	10
Total suspended solids	mg/l	50
Total coliform bacteria	MPN <sup>a</sup> / 100 ml	400 <sup>b</sup>

a : MPN = most probable number

b : not applicable to centralized, municipal, wastewater treatment systems which are included in EHS guidelines for water and sanitation

(Source: Environmental, Health and Safety (EHS) Guidelines, IFC, 2007)

### 3.3.2.4. Sound environment and noise

The IFC sound environment and noise standards encompass:

- Noise levels outside of the site boundaries. Noise impacts should not exceed the levels presented in the table below or result in a maximum increase in background levels of 3 dBA at the nearest receptor location off-site.
- Noise levels in a working environment, in order to protect worker's health.
- GDIZ and industries will have to comply with them.

**Table 12 : Noise level guidelines for off-site receptors**

Period	Industrial and commercial zones	Residential, institutional, educational <sup>(1)</sup>
Daytime (07:00 to 22:00)	70 dBA	55 dBA
Nighttime (22:00 to 07:00)	70 dBA	45 dBA

<sup>(1)</sup> In particular teaching, care and rest facilities

(Source: Environmental, Health and Safety (EHS) Guidelines, IFC, 2007)

**Table 13 : Noise levels for various working environment**

Location/activity	Equivalent level LAeq, 8h	Maximum LAmax, fast
Heavy industry (no demand for oral communication)	85 dBA	110 dBA
Light industry (decreasing demand for oral communication)	50-65 dBA	110 dBA
Open offices, control rooms, service counters, or similar	45-50 dBA	-
Individual offices (no disturbing noise)	40-45 dBA	-

(Source: Environmental, Health and Safety (EHS) Guidelines, IFC, 2007)



### **3.4. International regulatory framework for environmental protection**

#### **3.4.1. International conventions, agreements and treaties signed or ratified by Benin**

Benin, as part of its policy of protecting the environment and promoting human rights, has acceded to several international conventions, the most directly related to the implementation of the Project are presented in the tables below with environmental, cultural and labour conventions.

Table 14 : Multilateral conventions and agreements ratified by Benin – environmental protection

Conventions /agreements	Ratification	Signature	Scope	Interest for the ESIA
Convention on Persistent Organic Pollutants (POP)	5 January 2004	23 May 2001	By ratifying the Stockholm Convention on Persistent Organic Pollutants, Benin undertakes to comply with all the obligations of the Convention with a view to reducing or even eliminating Persistent Organic Pollutants in order to preserve its environment and consequently protect the lives of its citizens.	GDIZ will result in the emission of organic pollutants into the atmosphere. The obligations laid down in the POP Convention will make it possible to put in place strategies to reduce this pollution.
Convention on Persistent Organic Pollutants (POP) The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	5 January 2004	11 September 1998	The objective of the Convention is to prevent or reduce the incidence of occupational diseases and injuries caused by chemicals. It is convinced that it will ensure the protection of workers against the harmful effects of chemicals and enhance the protection of the public and the environment.	Workers involved in Project activities will be exposed to the incidence of illness and injury due to chemicals. Implementation of the requirements of this convention will ensure the protection of workers and the environment.
Kyoto Protocol	25 February 2002	11 December 1997	The Kyoto Protocol is an international agreement to reduce greenhouse gas emissions in addition to the United Nations Framework Convention on Climate Change, whose participating countries have been meeting once a year since 1995.	This protocol must be considered in the ESIA in order to assess the level of greenhouse gas (GHG) pollution in Benin. The obligations of the said protocol will be considered in the technical requirements to be drawn up in relation to the operational phase.
The Bamako Convention on the Prohibition of the Import into Africa of Hazardous Wastes and on the Control of Transboundary Movements and the	13 June 1997	30 January 1991	The Bamako Convention prohibits the import into Africa and the dumping or incineration of hazardous wastes at sea and in inland or ocean waters; establishes the precautionary principle; and provides for the sound management of such wastes within the continent.	This convention provides a basis for the management of the hazardous wastes that will be generated at the Project site. The management of these wastes must be carried out in a manner consistent with this convention. To this end, adequate management systems will have to be put in place by the managers of the industrial units.

Conventions /agreements	Ratification	Signature	Scope	Interest for the ESIA
Issue of Hazardous Wastes within Africa				
United Nations Framework Convention on Climate Change	30 June 1994	1992	The ratification of the Rio Framework Convention is a political act by which the Republic of Benin has undertaken, alongside the other nations of the world, to assume its share of responsibility for mitigating greenhouse gas emissions and for developing measures to adapt the population to the effects of climate change.	GDIZ will cause partial destruction of the vegetation cover. This situation is not without negative impact on the environment and the climate of the area. Based on the 3 main principles of the UNFCCC (the precautionary principle; the principle of responsibilities; the principle of the right to development) mitigation and adaptation measures will have to be put in place.
United Nations Convention to Combat Desertification (UNCCD)	29 August 1996	14 October 1994	This convention is linked to the previous one regarding climate change, from which Benin is not exempt.	The main objective of the Convention is to combat desertification and mitigate the effects of drought. Thus, the promoters of the IZ must provide for a reforestation plan.
Convention on Biological Diversity	30 June 1994	13 June 1992	The Convention is a legally binding international treaty with 3 main objectives: the conservation of biological diversity; the sustainable use of biological diversity; and the fair and equitable sharing of benefits arising out of the utilization of genetic resources. Its overall aim is to encourage measures that will lead to a sustainable future.	The implementation of GDIZ will result in the loss of biological diversity of the host site. Based on the requirements of the CBD, strategies for the conservation and sustainable use of biological resources requiring special attention will be developed.
Convention concerning the Protection of the World Cultural and Natural Heritage	14 June 1982	23 November 1972	For the purposes of this Convention, the following shall be considered as "cultural heritage", monuments, groups of buildings and sites with outstanding universal value from the point of view of history, art or science	The Project area hosts no UNESCO site.

**Table 15 : Multilateral conventions and agreements ratified by Benin - labour**

Conventions /agreements	Adoption	Ratification	Scope	Interest for the ESIA
Forced Labour Convention  Fundamental convention C029 1930	28 June 1930	12 December 1960	The Convention concerning Forced or Compulsory Labour entered into force on 1 May 1932. This Convention commits Benin to eliminating the use of forced or compulsory labour in all its forms as soon as possible.	Benin's ratification of the Convention shows that it is committed to the elimination of forced labour. However, within the framework of the Project activities, no form of forced labour should be observed.
Freedom of Association and Protection of the Right to Organise Convention  Fundamental convention C087 - 1948	29 July 1948	12 December 1960	This Convention concerning Freedom of Association and Protection of the Right to Organise entered into force on 4 July 1950. Workers' and employers' organizations have the right to draw up their statutes and by-laws, freely elect their representatives, organize their management and activities, and formulate their programs of action. The public authorities shall refrain from any intervention liable to limit this right or hinder its lawful exercise.	This agreement is indispensable because the Project induces the recruitment of workers in its implementation. It will therefore be necessary for workers' organisations to benefit fully from the right to organise.  This convention allows workers in companies to have a trade union to defend their interests.
Right to Organise and Collective Bargaining Agreement  Fundamental convention – C098 1949	1 July 1949	16 May 1968	This is the Right to Organise and Collective Bargaining Convention, 1949 (No. 98). Workers shall enjoy adequate protection against all acts of discrimination tending to impair freedom of association in respect of employment.	This agreement is indispensable because the Project induces the recruitment of workers in its implementation. It will therefore be necessary for workers to enjoy adequate protection against all acts of discrimination tending to undermine freedom of association in employment.
Equal Remuneration Convention  Fundamental convention C100 1951	29 June 1951	16 May 1968	This is the Equal Remuneration Convention, 1951 (No. 100). For the purposes of this Convention: (a) the term remuneration includes the ordinary basic or minimum wage or salary and any other consideration, whether in cash or in kind, which the worker receives directly or indirectly, in respect of the employment of the worker by the employer;	This convention is indispensable because the workers on the Project activities will be men and women. There must therefore be no discrimination in terms of remuneration. For the same work, remuneration must be equal for both sexes.

Conventions /agreements	Adoption	Ratification	Scope	Interest for the ESIA
			(b) the term equal remuneration for men and women workers for work of equal value refers to rates of pay set without discrimination based on sex. This convention reinforces gender requirements in labour agreements and law.	
Abolition of Forced Labour Convention  Fundamental convention C105 1957	25 June 1957	22 May 1961	This is the Convention concerning the Abolition of Forced Labour, which entered into force on 17 January 1959. Each Member of the International Labour Organisation which ratifies this Convention undertakes to take effective measures with a view to the immediate and complete abolition of forced or compulsory labour as described in Article 1 of this Convention. This Convention shows that Benin has abolished forced labour.	Benin's ratification of the Convention shows that it has abolished forced labour. Within the framework of the Project activities, no form of forced labour should be observed.
Discrimination (Employment and Occupation) Convention  Fundamental convention C111 1958	25 June 1958	22 May 1961	This Convention covers discrimination in respect of employment and occupation and entered into force on 15 June 1960. Each Member for which this Convention is in force undertakes to formulate and pursue a national policy designed to promote, by methods appropriate to national conditions and practice, equality of opportunity and treatment in respect of employment and occupation, with a view to eliminating discrimination in respect thereof.	In the Project area, there is discrimination in the employment of men and women. The Discrimination (Employment and Occupation) Convention will provide a basis for promoting the elimination of discrimination in employment and occupation in the Project area.
Minimum Age Convention (specified minimum age: 14 years and 12 for light work)  Fundamental convention C138 1973	26 juin 1973	11 June 2001	Article 4 provides that notwithstanding the provisions of paragraph 3 of this Article, any Member whose economy and educational institutions are not sufficiently developed may, after consultation with the organizations of employers and workers concerned, if any, specify, as a first step, a minimum age of 14 years.	This agreement is of vital interest to the ESIA as GDIZ will require the recruitment of labour and the minimum working age will have to be less than 14 years (12 for light works).

Conventions /agreements	Adoption	Ratification	Scope	Interest for the ESIA
			Under this Convention, no person below this minimum age shall be admitted to employment or work in any occupation.	
Worst Forms of Child Labour Convention  Fundamental convention C182 1999	17 June 1999	6 November 2001	This is Convention No. C182. This convention deals with the prohibition and immediate action for the elimination of the worst forms of child labour. It entered into force on 19 November 2000.	GDIZ is in an area where child labour is still prevalent. This convention is therefore indispensable for the prohibition of the worst forms of child labour in the Project activities.
Convention on the Elimination of All Forms of Discrimination against Women (CEDAW)	11 September 1981	12 March 1992	This gender-related Convention stipulates in Article 3 that States Parties shall take in all fields, in particular in the political, social, economic and cultural fields, all appropriate measures, including legislation, to ensure the full development and advancement of women, for the purpose of guaranteeing them the exercise and enjoyment of human rights and fundamental freedoms on a basis of equality with men.	In the Project area, men and women do not have the same rights. There is a marginalization of women in decision-making. Therefore, based on the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), the Project for the creation of GDIZ will have to promote gender equality in the workplace.
Labour Inspection Convention	11 July 1947	11 June 2001	This is the Labour Inspection Convention (No. 81), which brings Benin into the International Labour Organization (ILO). This convention obliges each member of the International Labour Organization for which this convention is in force to have a system of labour inspection in industrial establishments.	This agreement is essential for a Project that involves work involving manpower. GDIZ is designed to accommodate a diversity of industries (food processing, textiles, etc.) and will lead to job creation (recruitment of labour). Thus, a labour inspection system is required in the industrial units.



Conventions /agreements	Adoption	Ratification	Scope	Interest for the ESIA
Night Work of Children (Industry) Convention	29 october 1919	12 december 1960	Children under the age of 18 years shall not be employed or work at night in industrial undertakings, whether public or private, or in their dependencies, except where the needs of their apprenticeship or vocational training so require in specified industries or occupations requiring continuous work, the competent authority, after consultation with the organizations of employers and workers concerned, may authorize the employment at night of children who have attained the age of 16 years but are under the age of 18 years.	GDIZ will require night work in industrial enterprises. But this should not include children under the age of 18. The requirements of the Child Night Work (Industry) Convention will be followed by employers to avoid any situation of child night work in the Project.

### 3.4.2. Summary of the main international conventions also applicable to the Project

In addition to the multilateral conventions and agreements ratified by Benin in its environmental protection policy, there are other agreements, treaties and conventions that are also applicable to the Glo-Djigbe industrial zone Project. These conventions and agreements are summarized in the table below.

Table 16 : Summary of the main international conventions also applicable to the Project

N°	Title of the legal instrument	Key notions contained in the legal instrument	Dates of ratification/promulgation/adoption Ongoing ratification process
1	Paris Agreement (COP 21), 12 December 2015	The objective of the Paris Agreement is to strengthen the global response to the threat of climate change, in a context of sustainable development and the fight against poverty, by: (a) "containing the increase in global average temperature significantly below 2°C above pre-industrial levels and continuing efforts to limit the rise in temperature to 1.5°C above pre-industrial levels, on the understanding that this would significantly reduce the risks and impacts of climate change" (Article 2.1.a); (b) "enhancing capacity to adapt to the adverse effects of climate change and promoting resilience to climate change and low greenhouse gas-emitting development in a manner that does not threaten food production" (Article 2.1.b).	Ongoing ratification process
2	Rotterdam Convention on International Trade in Hazardous Chemicals and Pesticides.	The objective of the Convention is to prevent or reduce the incidence of occupational diseases and injuries caused by chemicals. It is convinced that it will ensure the protection of workers against the harmful effects of chemicals and enhance the protection of the public and the environment.	5 January 2004
3	Treaty establishing the African Economic Community (AEC)	It addresses issues related to the conservation and management of protected areas, the commitment to promote a healthy environment at the national, regional and continental levels, protection policies, strategies and programs and the establishment of appropriate institutions.	03 June 1991
4	Montreal Protocol on Substances that Deplete the Ozone Layer	The protocol contains a list of substances that can destroy the ozone layer and therefore need to be controlled. It includes an obligation for Parties to freeze their consumption and production of controlled substances and indicates numerous exceptions to the reduction	16 September 1987

N°	Title of the legal instrument	Key notions contained in the legal instrument	Dates of ratification/promulgation/adoption Ongoing ratification process
		obligations. Its objective is to reduce and eventually eliminate ozone-depleting substances.	
5	Vienna Convention for the Protection of the Ozone Layer	Parties' obligations under the Convention include: Parties shall take appropriate measures to protect human health and the environment from adverse effects resulting or likely to result from human activities that modify or are likely to modify the ozone layer. The Parties shall adopt appropriate legislative or administrative measures and co-operate to harmonize appropriate policies to regulate, limit, reduce or prevent human activities within their jurisdiction or control.	22 March 1985
6	African Convention on the Conservation of Nature and Resources	The basic principle of this Convention is described in Article 2 as follows: "The Contracting States undertake to take the necessary measures to ensure the conservation, use and development of soil, water, flora and fauna resources based on scientific principles and taking into consideration the major interests of the population. »	15 September 1968

### 3.5. Environmental and social responsibility of the promoter

ARISE believes that maintaining high environmental, social and governance (ESG) standards is the best method to mitigate risks and will help to generate value sustainably through better governance, socially positive outcomes and reducing ARISE's environmental impact. ARISE is therefore committed to respect the International Finance Corporation (IFC) Performance Standards for Environmental and Social Sustainability across its corporate and project level practices. It also has a clear and well-structured set of environmental and social policies and standards to which it abides by, which are gathered in the company Environmental and Social Management System (ESMS) Manual (cf. § 10.2.1).

#### 3.5.1. ARISE corporate environmental and social policies

ARISE ESG performance objectives are supported by several associated corporate policies which are, but not limited to:

- Ethical Recruitment Policy
- Code of conduct
- Environmental Sustainability Policy (ESP)
- Health and Safety Policy (HSP)

### 3.5.2. IFC Performance Standards

ARISE has committed to comply with the IFC Performance Standards across all its projects. The IFC is an international organization whose mission is to promote sustainable private sector development in developing countries in order to contribute to the fight against poverty.

In 2012, IFC published a set of 8 Performance Standards (PS) that have become an international benchmark for the social and environmental assessment process in which IFC and other international donors have been engaged. These standards provide guidance for identifying risks and impacts, helping to avoid, mitigate and manage risks and impacts so that planned activities can continue in a sustainable manner.

These standards are accompanied by guidance notes, which include provisions for the effective consideration of gender and social inclusion issues. The integration of this guidance by client enterprises is aimed at ensuring that individuals or communities that are poor, disadvantaged or vulnerable in the current situation are not disproportionately affected and will not suffer more than other social categories from the disruption and negative impacts of the Project. Their systematic consultation by client companies is a first step in ensuring the inclusion of vulnerable groups represented by women and persons with disabilities (PWD).

These performance standards are detailed in the table below.

**Table 2 IFC Performance Standards**

N°	Performance standards	Objectives
PS1	Assessment and management of environmental and social risks and impacts	<ul style="list-style-type: none"> <li>Identify and assess the social and environmental impacts, both negative and positive, in the project's area of influence.</li> <li>Avoid or, where this is not possible, minimize, mitigate or compensate for negative impacts on workers, affected communities and the environment.</li> <li>Ensure that affected communities are appropriately engaged in the resolution of issues that may affect them.</li> <li>Promoting better social and environmental performance of companies through the effective use of management systems.</li> <li>Ensure that potentially affected populations and especially vulnerable groups such as PSHs and women, due to their current precarious situation and negative societal attitudes and prejudices towards them, are specifically informed and consulted and/or favoured in relation to certain actions or processes.</li> </ul>
PS2	Workforce and working conditions	<ul style="list-style-type: none"> <li>Establish, maintain and improve the relationship between management and workers.</li> <li>Promote the fight against discrimination and equal opportunities and treatment of workers and respect for national labour and employment law.</li> <li>Protecting workers by combating child and forced labour.</li> <li>Promoting safe and healthy working conditions and protecting and promoting the health of workers.</li> </ul>

N°	Performance standards	Objectives
PS3	Rational use of resources and pollution prevention	<ul style="list-style-type: none"> <li>Avoid or reduce negative impacts on human health and the environment by avoiding or reducing pollution generated by project activities.</li> <li>Promote the reduction of gas emissions that contribute to climate change.</li> </ul>
PS4	Community Health, Safety and Security	<ul style="list-style-type: none"> <li>Avoid or minimise risks and impacts on health, particularly in relation to communicable diseases such as STDs and HIV/AIDS, and the safety of the local community during the life cycle of the project, taking into account the different risks and needs of men and women and other social groups in these areas.</li> <li>Ensure the protection of personnel and property in a legitimate manner that avoids or reduces risks to the safety and protection of the community.</li> </ul>
PS5	Land acquisition and involuntary resettlement	<ul style="list-style-type: none"> <li>Avoid or at least minimize forced relocation wherever possible by exploring alternative project designs.</li> <li>Mitigating negative social and economic impacts resulting from the acquisition of land or restrictions on its use by affected persons, providing compensation for the loss of assets at replacement cost and ensuring that displacement activities undertaken are accompanied by appropriate information provision, consultation and informed participation of affected populations.</li> <li>To improve or at least restore the livelihoods and standard of living of displaced persons, especially vulnerable groups represented by women heads of households and PAPs, who will be affected more severely than other social categories because of their vulnerability and poverty.</li> <li>To improve the living conditions of PAPs through the provision of adequate housing whose possession is guaranteed at destination sites. Avoid, or at least minimize forced displacement whenever possible, by exploring alternative project designs; Avoid, or at least minimize forced displacement whenever possible, by exploring alternative project designs.</li> </ul>
PS6	Biodiversity conservation and sustainable management of living natural resources	<ul style="list-style-type: none"> <li>Protecting and conserving biodiversity.</li> <li>Promote the sustainable management and use of natural resources through the adoption of approaches that integrate conservation needs and development priorities.</li> </ul>

N°	Performance standards	Objectives
PS7	Indigenous Peoples	<ul style="list-style-type: none"> <li>To ensure that the development process promotes full respect for the dignity, human rights, aspirations, cultures and natural resource-based livelihoods of indigenous peoples.</li> <li>Avoid negative impacts of projects on Indigenous Peoples' communities or, if this is not possible, minimize and mitigate such impacts or compensate these communities and provide them with opportunities for culturally appropriate development benefits.</li> <li>Establish and maintain an ongoing relationship with Indigenous Peoples affected by a project throughout the life of the project.</li> <li>Promote good faith negotiation with and free and informed participation of Indigenous Peoples when projects are to be located on traditional or customary lands used by Indigenous Peoples.</li> <li>Respect and preserve the culture, knowledge and practices of Indigenous Peoples.</li> </ul>
PS8	Cultural Heritage	<ul style="list-style-type: none"> <li>Protect cultural heritage from the negative impacts of project activities and support its conservation.</li> <li>Promote the equitable distribution of benefits from the use of cultural heritage in commercial activities.</li> </ul>

### **3.5.3. National regulatory and IFC standards gap analysis**

The Project requirements refer to those developed by the international standards, such as the IFC's performance standards. A comparison of the obligations arising from national regulations with those of these standards is made in the following table. If deviations are observed, the most restrictive regulation or directive will be applied.



Table 3 Gap analysis between national legislation and IFC standards

IFC performance Standards	Objectives	National Legislation	Compliance
PS 1 - Assessment and management of environmental and social risks and impacts	<ul style="list-style-type: none"> <li>* Assessment and management of environmental and social risks and impacts;</li> <li>* Identify and assess the social and environmental impacts, both negative and positive, in the area of influence of the project;</li> <li>* Avoid or, where this is not possible, minimize, mitigate or compensate for negative impacts on workers, affected communities and the environment;</li> <li>* Ensure that affected communities are appropriately engaged in resolving issues that may affect them;</li> <li>* Promote better social and environmental performance of companies, through the efficient use of management systems.</li> </ul>	<p>Law n°98-030 of 12 February 1999 on the framework law on the environment</p> <p>Decree n°2017-332 of 6 July 2017 on the organisation of environmental assessment procedures in the Republic of Benin</p>	<p><b>Partial Compliance.</b></p> <p>The regulatory framework applied in Benin is appropriate for the implementation of environmental and social safeguards procedures. In effect, the decree presented below is sufficiently explicit to guide and frame the E&amp;S procedures. Nevertheless, stakeholder engagement and the collection of their expectations and concerns are not clearly identified in the Decree but are shortly mentioned in the General Guide to Implementing an ESIA. The dissemination of information is well considered in national legislation, particularly through public hearings. Thus, the national legislation presents some shortcomings in the scope of consultations and the involvement of stakeholders, in terms of application. Also, to fill these gaps, the grievance processes and communication measures defined in the ESMP will be implemented.</p>
PS 2 – Labour force and working conditions	<ul style="list-style-type: none"> <li>* Promote fair treatment, non-discrimination and equal opportunities for Workers;</li> <li>* Establish, maintain and improve relations between workers and management;</li> <li>* Promote respect for national labour and employment law;</li> <li>* Protect workers, including vulnerable categories of workers viz. children, migrant workers, third-party recruited workers and workers in the customer's supply chain;</li> <li>* Promote safe and healthy working conditions and protect the health of workers;</li> <li>* Avoid the use of forced labour.</li> </ul>	<p>Law n°98-004 of 27 January 1998 on the Labour Code in the Republic of Benin</p>	<p><b>Compliance.</b></p> <p>The beninese Labour Code addresses all the key points of the PS 2 and prohibits forced labour, vulnerable categories and incorporates the concept of health and safety in the protection of workers.</p>

IFC performance Standards	Objectives	National Legislation	Compliance
PS 3 – Rational use of resources and prevention of pollution	<ul style="list-style-type: none"> <li>* Minimise negative impacts on human health and the environment;</li> <li>* Reduce GHG emissions related to projects;</li> <li>* Promote sustainable use of resources, particularly energy and water.</li> </ul>	Law n°98-030 of 12 February 1999 on the framework law on the environment	<p><b>Partial compliance.</b></p> <p>The general principles defined by this law aim to protect the environment and put an end to all sort of pollution and degradation in all environmental compartments.</p> <p>However, the concept of sustainable consumption is slightly addressed, and climate change is completely absent.</p> <p>It is important to note though the ongoing elaboration of a law to limit the harmful effects of climate change in Benin.</p>
PS 4 – Community Health, Safety and Security	<ul style="list-style-type: none"> <li>* Anticipate and avoid, during the life of the project, the negative impacts on the health and safety of the affected communities which may result from ordinary or non-ordinary circumstances;</li> <li>* Ensure that the protection of staff and assets is ensured in accordance with applicable human rights principles and in a manner that avoids exposing the affected communities to risks or to minimize them.</li> </ul>	Law n°98-030 of 12 February 1999 on the framework law on the environment	<p><b>Partial compliance.</b></p> <p>The general principles defined by this law aim to protect the environment, preventing and anticipating actions likely to have negative effects on the environment in order to improve the living environment. It indicates the need to deposit hazardous materials in authorized places.</p>

IFC performance Standards	Objectives	National Legislation	Compliance
PS 5 – Land resettlement	<ul style="list-style-type: none"> <li>* Avoid, and whenever this is not possible, limit involuntary resettlement by considering alternative designs to projects.</li> <li>* Avoid forced eviction.</li> <li>* Anticipate and avoid, or where it is not possible to avoid, limit negative social and economic impacts resulting from the acquisition of land or restrictions on its use by: (i) providing compensation for the loss of land 'assets at replacement price and (ii) ensuring that resettlement activities are accompanied by appropriate communication of information, consultation and informed participation of affected persons.</li> <li>* Improve or at least restore the livelihoods and living conditions of displaced persons.</li> <li>* Improve the living conditions of physically displaced persons through the provision of adequate housing with security of tenure in resettlement sites.</li> </ul>	<p>Law n°2013-01 of 14 August 2013 on the Land and State Land Code (CFD) in the Republic of Benin</p> <p>Decree n°2015-013 of 29 January 2015</p>	<p><b>Partial compliance.</b></p> <p>The law sets out the legal provisions relating to access to property, the procedures and time limits relating to land transactions, the procedure for confirming rights and expropriation of public interest. It also indicates the right to expropriate any holder of land rights for public interest in exchange for fair and prior compensation.</p> <p>The compensation provisions for expropriation are presented in the decree.</p> <p>However, the regulations do not mention the need to draw up a PAR and do not make a precise distinction between the different PAPs.</p>
PS 6 - Biodiversity conservation and sustainable management of living natural resources	<ul style="list-style-type: none"> <li>* Protect and conserve biodiversity</li> <li>* Maintaining the benefits of ecosystem services;</li> <li>* Promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.</li> </ul>	<p>Law n°93-009 of 2 July 1993 on the forest regime in the Republic of Benin</p>	<p><b>Partial compliance.</b></p> <p>Although the concept of ecosystem service and habitat is not addressed in Benin regulations, sustainable forest management involving the protection of forests and these resources is presented.</p>

IFC performance Standards	Objectives	National Legislation	Compliance
PS7 – Indigenous people	<ul style="list-style-type: none"> <li>* Ensure that the development process promotes full respect for the human rights, dignity, aspirations, cultures and livelihoods based on the natural resources of Aboriginal populations</li> <li>* Anticipate and avoid negative impacts of projects on aboriginal population' communities and if it is not possible, reduce, restore and/or compensate these impacts.</li> <li>* Promote culturally appropriate benefits and opportunities related to sustainable development for Aboriginal populations.</li> <li>* Establish and maintain with aboriginal populations affected by a project throughout its duration a permanent relationship based on Informed Consultation and Participation (ECP).</li> <li>* Obtain the Free, Prior and Informed Consent (FPIC) of Indigenous Peoples where the circumstances described in this Performance Note exist.</li> <li>* Respect and preserve the culture, knowledge and practices of aboriginal people.</li> </ul>	-	<b>No Compliance.</b> Such legislative provisions do not exist in beninese law.
PS8 -Cultural heritage	<ul style="list-style-type: none"> <li>* Protect cultural heritage from the negative impacts of project activities and support its preservation.</li> <li>* Promote the equitable distribution of benefits of the use of cultural heritage.</li> </ul>	Law n°2007-20 of 23 August 2007 on the protection of cultural heritage and natural heritage of a cultural nature in the Republic of Benin	<b>Compliance.</b> The law incorporates the protection and safeguarding of cultural goods by establishing a classification of goods.

## 4. Project description

### 4.1. Objectives of the project

GDIZ aims to offer a competitive ecosystem to foreign and national investors to increase production within the national territory. The proposal to investors will include an attractive legal and fiscal framework (exemption from taxes and customs duties and the establishment of a single window for all administrative supports and facilitations). The Project will also benefit from strong government support (competitive access to energy guaranteed by the State, etc.).

Thanks to this attractive environment, GDIZ will host a first-class business park focused mainly on agro-industry, offering serviced land, common infrastructure and shared public services (water, electricity and wastewater treatment) and competitive access to Benin's natural resources.

Privileged support will be given to all agro-commodity processing industries, as well as industries which will target production of consumer products and the industries that will boost the local contents. Benin is one of the world's leading producers of cotton and cashew nuts (n°7 for cashew nuts and n°12 for cotton) and these products are currently exported unprocessed, which currently restricts the huge added-value potentials in this sector. The Government of Benin has therefore decided to gradually implement reduction of the export of cotton and non-woven yarn and similar actions are planned for other agro-commodities including raw cashew nuts in order to encourage international traders and industrial actors currently engaged in export of these agro-commodities from Benin to process them locally. It is expected that the companies currently engaged in exporting the agro-commodities will subsequently look for alternative business opportunities which is setting up of processing industries in the GDIZ with help of their current buyers to accomplish their business endeavors. GDIZ will cater to this new demand by providing ready and serviced plots to promote the growth of the industrial processing within the national territory of Benin.

To facilitate the establishment of these processing industries, the industrial zone will also need to engage with the upstream and downstream value chains in order to ensure that the industrial operations have redundant supply of raw materials, that the industries have no logistical challenges in the procurement of raw materials as well as the marketing their products. The key areas of interventions shall be following but may not be limited to these:

- Managing collection of the agro-commodities.
- Transportation to the Industrial Zone.
- Warehousing (dry warehouse) of the agro-commodities under suitable conditions and providing in controlled quantities to facilitate the industrial operations.
- Facilitating the transportation of the finished/processed industrial products (managing container yard / truck terminal) to transport the products to its destination which may be not restricted to the Port of Cotonou.
- International marketing (in case required) in terms of promotion and participation /representation in international trade fairs to promote the products made in the Industrial Zone of Benin.

For cotton, which is one of the primary focus industries - GDIZ will encourage not only the development of spinning and weaving mills, but also garmenting to ensure maximum product value additions within the national territory.

Thanks to its economic model, GDIZ will be very attractive and will contribute significantly to Benin's socio-economic development, through the industrialization of the country and the creation of jobs.

## **4.2. GDIZ Project master plan**

### **4.2.1. Detailed master plan**

The main driver for the development of a detailed master plan is to promote an integrated development through providing closer interaction between industries and support infrastructure facilities like commercial, residential and physical infrastructure. The master plan will provide guidance for development of GDIZ over the next 25 to 30 years.

The Project master plan is shown in the figure below. It is based on 1,640 Ha with industrial townships covering 1,461.94 ha as per the landuse allocations.





(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

Figure 8 : Detailed master plan

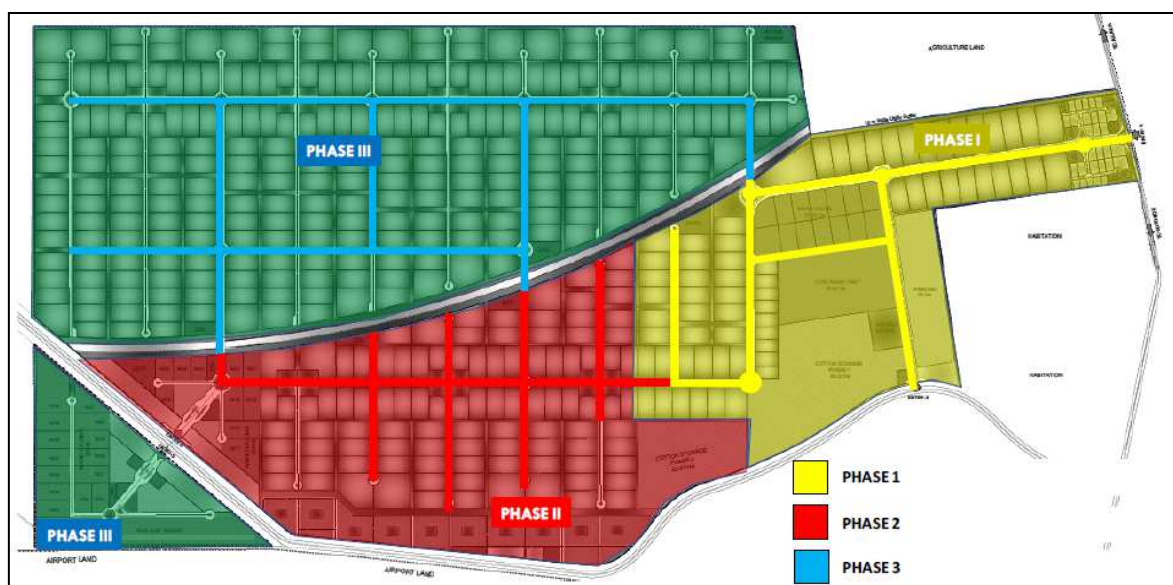
## 4.2.2. Phasing of the Project

GDIZ will be developed progressively in order to optimize investments and Project profitability. The Project will be carried out in 3 phases as displayed in the table below.

Table 4 GDIZ phases and associated surfaces

N.	Phases	Area (in ha)	Plots for lease
1	Phase 1	313.97	125
2	Phase 2	374.38	139
3	Phase 3	773.59	296
<b>Total</b>		<b>1,461.94</b>	<b>560</b>

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

Figure 9 : Project's evolution phases

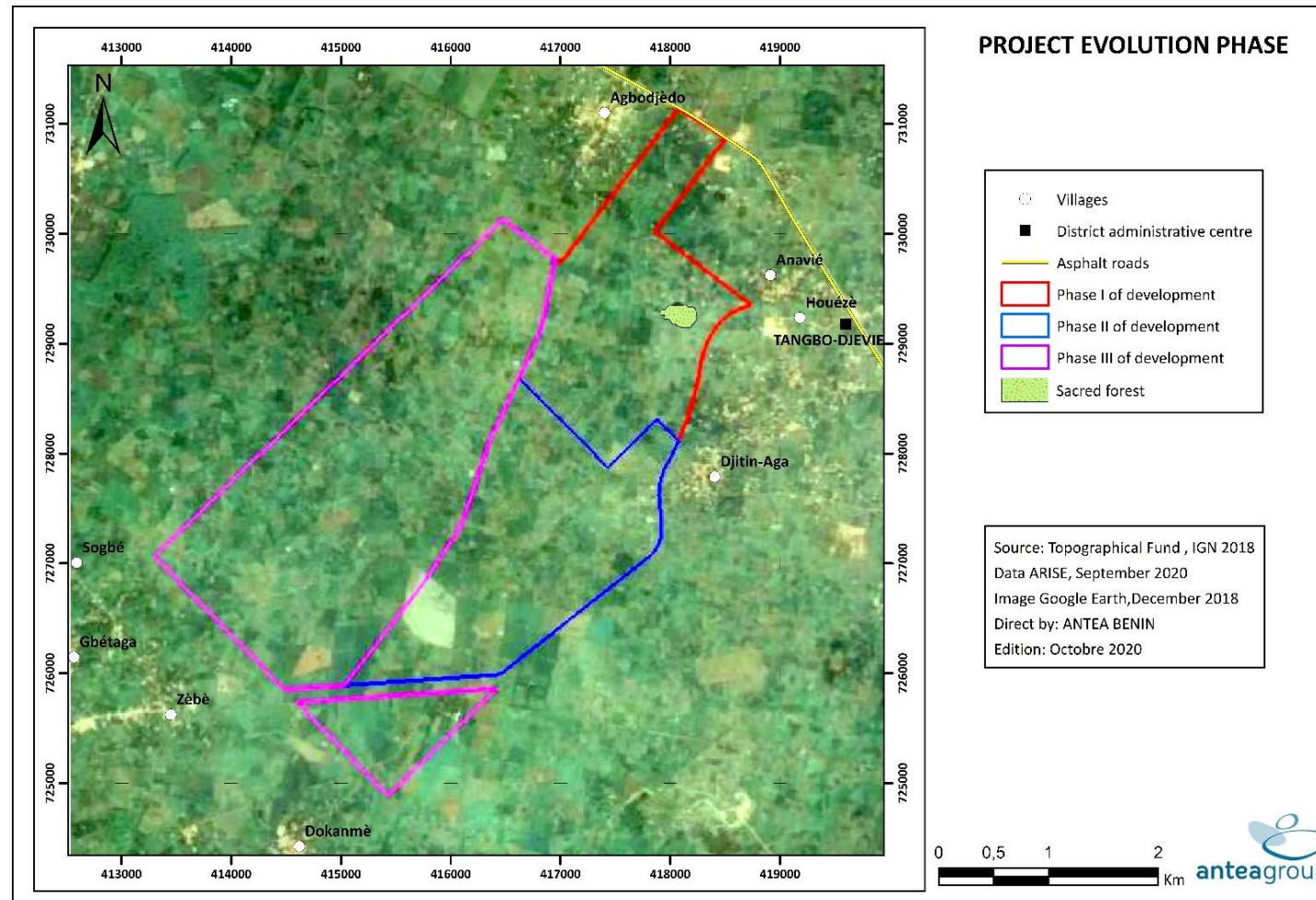


Figure 10 : Map locating the Project's evolution phases



**Phase n°1** represents the development of approximately 313 ha, dedicated to different forms of land use (industrial, commercial, social facilities, etc). This phase will last 2 years and will accommodate 125 plots intended for lease. Land uses to be developed for this phase, associated surfaces and number of plots per category of land uses are presented in the table below.

**Table 5 GDIZ phase 1 land use, surfaces and number of plots**

N.	Land use	Area (in ha)	Number of plots per category of land use
1	Industrial	129.07	64
2	Commercial	11.56	31
3	Warehouse & Logistics	24.28	14
4	Parking	20.18	1
5	Facility	5.60	13
6	Cotton Storage	46.52	1
7	Container Yard	25.64	1
8	Residence	0.00	0
9	Green and Open	15.31	0
10	Road Area	35.81	0
<b>Total area</b>		<b>313.97</b>	<b>125</b>

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Phase n°2** represents the development of 374.38 ha and will last from 3 to 5 years. It will accommodate a total of 139 plots for lease.

**Table 6 GDIZ land use, surfaces and number of plots**

N.	Land use	Area (in ha)	Number of plots per category of land use
1	Industrial	199.1	99
2	Commercial	13.0	4
3	Warehouse & Logistics	17.7	10
4	Parking	4.2	2
5	Facility	9.9	11
6	Cotton Storage	25.1	1
7	Container Yard	0.00	0
8	Residence	33.7	12
9	Green and Open	29.5	0
10	Road Area	42.2	0
<b>Total area</b>		<b>374.38</b>	<b>139</b>

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Phase n°3** represents the development of 773.59 ha and is expected to last from 6 to 8 years. It will accommodate 296 plots.

Table 7 GDIZ phase 3 land use, surfaces and number of plots

N.	Land use	Area (in ha)	Number of plots per category of land use
1	Industrial	502.40	257
2	Commercial	7.53	2
3	Warehouse & Logistics	49.22	15
4	Parking	7.82	2
5	Facility	16.66	20
6	Cotton Storage	0.00	0
7	Container Yard	0.00	0
8	Residence	0.00	0
9	Green and Open	105.21	0
10	Road Area	84.75	0
Total area		773.59	296

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

### 4.2.3. Project land use

The future GDIZ presents 5 main types of land use i.e. industrial, logistic, residential, commercial and green spaces. The development of these land uses is detailed as follows:

#### Industrial land development

The Project provides for an industrial spine road inside the industrial area, which will connect all the industrial plots to the major connecting road from Cotonou and Allada. The concept of gridiron design and modular industrial units will aid in the flow of traffic and safety aspects.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

Figure 11: Industrial zones

### **Logistics development**

The main logistics, warehouse and storage area has been planned near the entry location so that freight traffic could be conveniently transported to and from GDIZ. The logistic area is also located near the central spine road in order to be accessible to industries within the GDIZ. Another logistic and warehousing area has been planned at southern part of the site so as to have access to the future railway siding facility for easy movement of freight to the port.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Figure 12: Logistics zones**

### **Residential development**

The housing is proposed to be developed at southeast corner of the site as seen below. The residential area has been planned to cater for housing needs of direct and indirect employment generated by industries and related activities. It has been divided into clusters that are generally rectangular in shape and formed by gridiron pattern of road network with each cluster having central green areas.



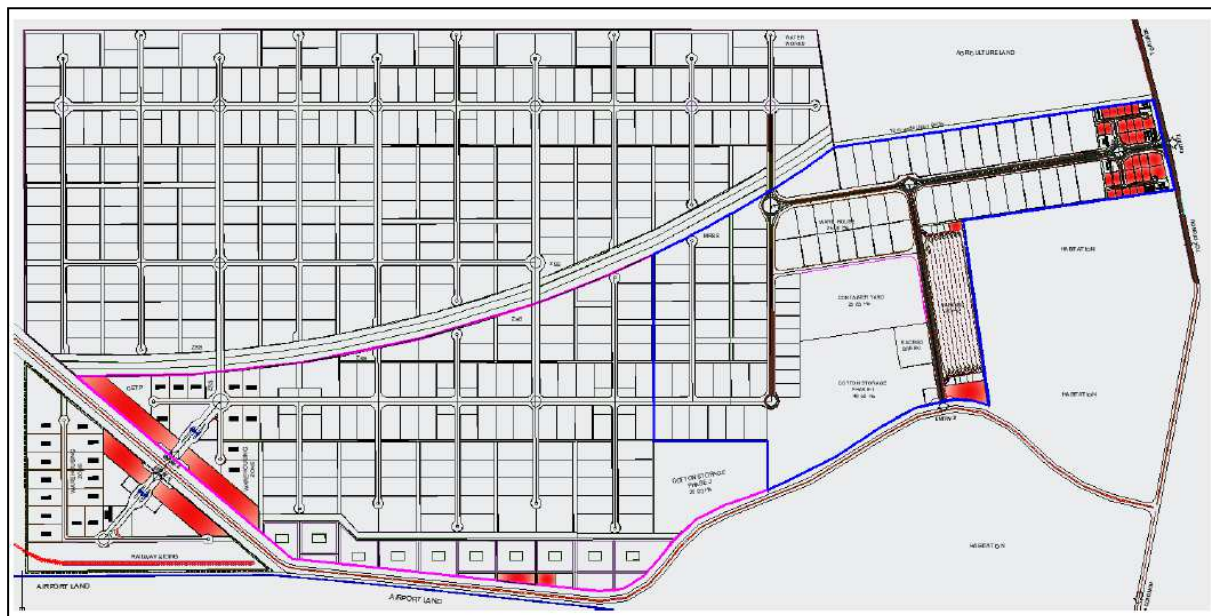
(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Figure 13: Residential zone**



### **Commercial development**

Commercial areas have been planned near entries along the major arterial road at the entrance of the site, making it easily accessible to the industries, along with along the future railway. The different facilities which can be developed in the commercial area are shops, offices banks and ATMs.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Figure 14: Commercial zones**

### **Open and green spaces**

Open space and green areas are a significant component of land use, in a wish of the promoter to keep a natural environment in the vicinity of the otherwise industrial areas. The clusters within the residential area have been provided with a community level green space. The green areas provided represents an opportunity to integrate nature with the residential area and provide individuals with spaces to experience nature in their everyday life. Green areas are all accessible withing walkable distances. The residential areas are separated from the rest of the site by these green belt buffer zones.





(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Figure 15: Open and green spaces**

The overall distribution of the Project's land use will be as follows.

**Table 17 : Land use typology for the entire IZ**

S. No.		Land Area	
		%	Ha
<b>1</b>	<b>Industrial Zone</b>	<b>56.81%</b>	<b>830.55</b>
1.1	Cotton & Textile Sector	50.0	415.27
1.2	Cashew Sector	15	124.58
1.3	Soyabean Sector	15	124.58
1.4	Food & Beverage Processing sector (Pineapple, meat etc)	10	83.05
1.5	Other Manufacturing (Timber, Metal recycling, Pharma formulation....)	10	83.05
<b>2</b>	<b>Commercial Zone</b>	<b>2.20%</b>	<b>32.12</b>
<b>3</b>	<b>Warehouse &amp; Logistic</b>	<b>6.24%</b>	<b>91.17</b>
<b>4</b>	<b>Parking</b>	<b>2.20%</b>	<b>32.23</b>
<b>5</b>	<b>Facility</b>	<b>2.20%</b>	<b>32.12</b>
<b>6</b>	<b>Cotton Storage</b>	<b>4.90%</b>	<b>71.61</b>
<b>7</b>	<b>Container Yard</b>	<b>1.75%</b>	<b>25.64</b>
<b>8</b>	<b>Residences</b>	<b>2.31%</b>	<b>33.70</b>
<b>9</b>	<b>Green &amp; Open</b>	<b>10.26%</b>	<b>150.07</b>
<b>10</b>	<b>Transportation (Area under roads)</b>	<b>11.13%</b>	<b>162.73</b>
	<b>Total</b>		<b>1,461.94</b>

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone, Benin, May 2020)

#### 4.2.4. Sustainable design components

The Sustainable Development Goals (SDGs), adopted by all United Nations Member States in 2015, provide guidances for global, regional and national development endeavours till 2030. The envisaged GDIZ with its development vision and goals, will target to reach at SDGs 8, 9 and 11:

- **Goal 8 – decent work and economic growth:** GDIZ aims to contribute to a structural transformation of the economy by increasing the capacities of local industries for economic diversification and export promotion, as well as by creation of jobs in industry and industryrelated services.
- **Goal 9 – industry, innovation and infrastructures:** GDIZ aims to build infrastructure, in compliance with global best practices and accepted standards and norms, to create capacities for production to promote rapid economic growth, build trade capacities, provide inclusive employment and work towards environmentally sustainable growth.
- **Goal 11 – sustainable cities and communities:** GDIZ aims to create a sustainable and green zone with inclusive and safe residential and commercial developments for the working community of the industrial zone. Adequate green and open spaces, social facilities and public realm, for a resilient quality of life are part of the master plan.

A few of the salient features of the sustainability of the development incorporated in master planning and design stage are:

1. Site planning and land grading based on the natural slope of the land and drainage lines
2. Water Management
3. Renewable energy
4. Landscaping with native and endemic species and local flora
5. Design of green infrastructure – tree shaded footpaths, to encourage walking and bicycling
6. Demarcation of a separate 2-wheeler lane to enhance inclusivity and safety of vehicular movement.

#### 4.2.5. Expected employment

A total of 11,609 direct workers, 58,044 indirect workers and approx. 9,391 resident population have been projected for the proposed GDIZ.

Table 8 Expected employment for the GDIZ

Phase	Direct workers	Indirect workers	Residents
Phase 1	2,583	12,916	
Phase 2	3,118	15,588	9,391
Phase 3	5,908	29,540	
<b>Total</b>	<b>11,609</b>	<b>58,044</b>	<b>9,391</b>

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

### 4.3. Project components

The site layout includes different types of utilities and administrative buildings to offer a variety of services to businesses and industries setting up there:

- shared utilities;
- common administrative buildings;
- logistical infrastructure.

These different types of infrastructure are presented and detailed in the following paragraphs.

#### 4.3.1. Utilities

##### 4.3.1.1. Electricity supply and distribution system

The Project's demand of electricity is estimated to be 107MW at any given time with a tolerance of +/- 10%. GDIZ electricity supply is based on the following assumptions:

- GDIZ receive HT power supply either from the Government or from other source from the nearest power station;
- electricity supply is expected to be provided by 90kv transmission line with double circuit combination to provision the 2 first phases. A newly dedicated 90KV transmission line with single circuit is expected for the phase 3;
- 2 substations will be built, one (MRSS # 1) for phase 1 and 2 and a second (MRSS # 2 – extension of the first substation) is foreseen for phase n°3, and will receive 90kv electricity supply and step down the voltage to 20KV for onward distribution to GDIZ;
- Zonal Switching Stations (ZSS) will be developed (3 in phase 1, 3 in phase 2 and 6 in phase 3) feeding with 20KV lines connected to take off outgoing circuits at to each ZSS unit, with a line capacity of 2 X 8MW;
- 20KV distribution networks will be built from each ZSS to connect each industry and other facilities with O/H line capacity of 3 MW each. Besides, 1 of 20KV outgoing circuits are reserved to connect Bulk/Heavy Load industries directly from MRSS without necessarily passing through ZSS.

Solar panels placed on the roof top may be used for additional power generation on specific buildings (mainly green buildings).

The location of the Project's electrical sub-station and zonal switching stations is shown in figure below.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

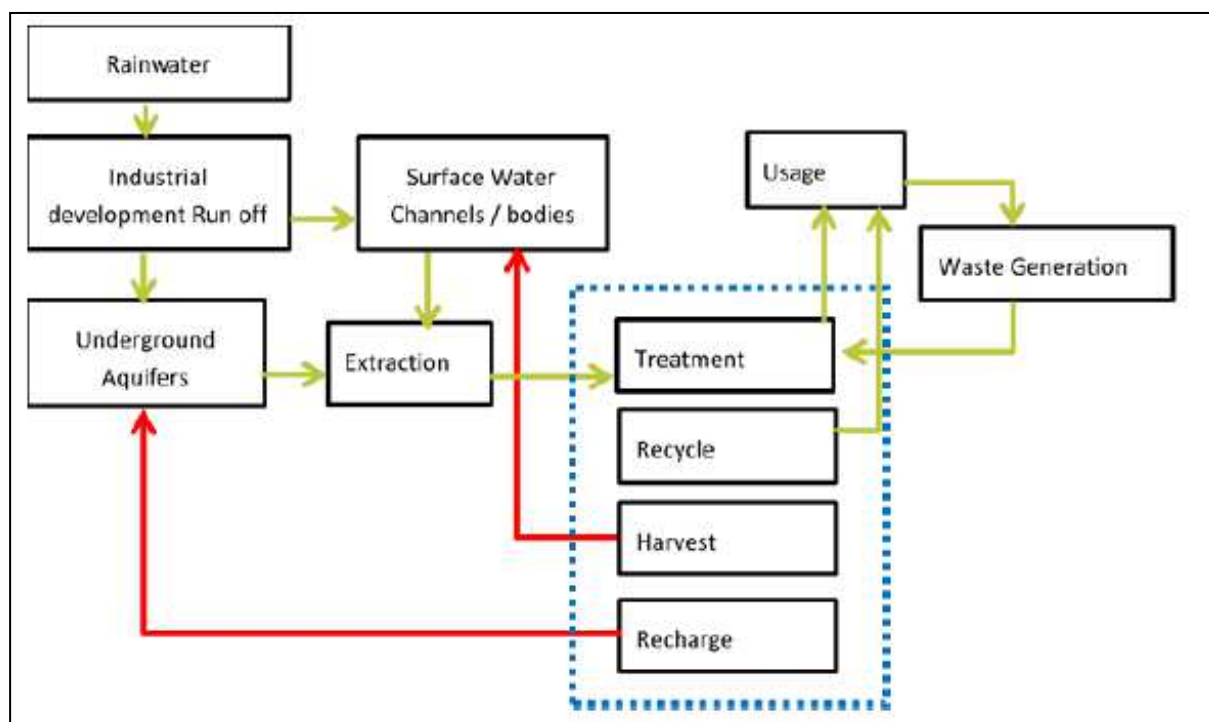
**Figure 16 Location of electrical sub-station and zonal switching stations**

#### 4.3.1.2. Water management system

A complete water management system along with adequate infrastructures will be developed covering water inputs, water distribution and treatment of wastewaters before their release into the environment. The scheme below underlines the concept of water management on GDIZ.

A central drainage channel along with several natural drainage channels and recharge areas have been created for the entire Project and adapted to the site gradient. The source of water will be groundwater. The extracted water will be used efficiently, treated and recycled to the possible extent as well as recharged through passive design measures such as gabion structures in the central drainage channel.

Rainwater will also be managed thanks to a stormwater management system. Unlined channels and bio-swales are designed for the conveyance of the run-off waters generated to the centrally planned drainage channel across the site.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

Figure 17 Water management

#### 4.3.1.2.1. Water supply

The proposed water supply assets are made of water resources (through borewells), treatment unit, storage tanks, transmission and distribution pipelines with associated auxiliary units such as valves, bulk flow meters, etc.

The main components of the water supply system for the water management are developed below. However, further detailed technical studies are in progress to precise the supply system design and the adequate sizing of the proposed infrastructures. The elements presented here might therefore change in the future depending on the results of these studies.

#### Water resource

A detailed study needs to be conducted at the identified water works locations to estimate the potential of availability of ground water. The outcome of the investigations shall need to be followed for installation of deep borewells.

At this stage it is assumed that the yield of each borewell is about 20 m<sup>3</sup>/hr with maximum of 15 hours of pumping. However, the onsite drilling and pumping tests will provide the actual yield and other related parameters, the figures that are assumed at this stage are just indicative.

The quality of the groundwater is not known at the concept stage, but it is expected that the water analysis at the different water works locations shall be carried out in the subsequent stages and depending on these results, treatment shall be provided to make the water usable for industries and other purposes.

It is expected to conduct the drilling of 200 borewells with a success rate over 98%.



### Water demand

The total water demand for phase 1 and 2 is estimated to be about 7 Mm<sup>3</sup> and 11 Mm<sup>3</sup> per day for phase 3. The water requirements to accommodate the different land uses are estimated below.

**Table 9 Water demand calculation per day**

Description	Phase 1 and 2	Phase 3
Gross Project area, Ha	688.32	773.58
Net industrial area, Ha	370.02	657.54
Gross warehouse, storage area, Ha	178.38	
Gross residential area, Ha	46.00	
Gross commercial area, Ha	28.62	
Road area, Ha	65.30	116.04
Industrial grade water demand @ 15 m <sup>3</sup> /ha, in m <sup>3</sup>	5,483.73	9744.79
Ind. Grade water for warehouse, storage @1.25 m <sup>3</sup> /ha, in m <sup>3</sup>	220.30	0.00
Residential population @ 100/Ha	4,600	0.00
Commercial population @ 200/Ha	4,854	0.00
Residential water demand @ 150 LPCD, in m <sup>3</sup>	690	0.00
Commercial water demand @ 45 LPCD, in m <sup>3</sup>	218	0.00
Assume 10% overall losses, in m <sup>3</sup>	661	974
<b>Total water demand in m<sup>3</sup> per day</b>	<b>7,053</b>	<b>10,719</b>

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

Providing enough on-site storage facilities would ensure continuous availability of water, even in emergency situations. As part of the contingency plan, at least 16-hour demand storage facilities have been provided at each of the water works. A 4:1 ratio has been followed in determining the overall number of borewells *i.e.* one additional borewell for every 4 borewells shall act as a stand by.

Industrial grade water *i.e.* underground water (without treatment) should be supplied for industrial needs and potable water with drinkable standards (with treatment) should be supplied for residential and commercial users.

### Water storage

Two types of reservoirs will be used: ground level service reservoirs (GLSR) and overhead service reservoirs (OHSR). The table below presents the amount of water storage units that will be developed.

**Table 10 Total number of reservoirs required in GDIZ**

Characteristics	Phase 1 and 2	Phase 3
Number of GLSR	6	5
Total capacity of GLSR (m <sup>3</sup> )	5,150	6,650
Number of OHSR	4	2
Total capacity of OSLR (m <sup>3</sup> )	2,100	1,450
Pumping stations	4	2
<b>Total storage (m<sup>3</sup>)</b>	<b>7,250</b>	<b>8,100</b>

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

### Distribution system

The network of pipelines that originate from water works to service the zonal areas are called transmission and distribution pipelines. The larger diameter pipelines above 300mm are usually termed as transmission system and smaller diameter pipelines up to 200mm are used for distribution system. Around 69 km of pipelines will be laid down.

**Table 11 Approximate size and length of pipelines for GDIZ**

Characteristics	Phase 1 and 2 Length in m.	Phase 3 Length in m.
Pipeline > 200mm size	15,431	24,687
Pipeline < 200mm size	19,004	10,423

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

Each property located in the Project area shall be given a single water connection of suitable size. A consumer meter shall be installed at the other end inside the property premises.

#### **Water supply zoning**

The Project area has been divided into water supply zones and each zone will be fed from a specific water supply depending on the zones' characteristics (topography, demand, quality of water).

For Phase 1 and 2, water demand estimation including fire demand and losses is at 7.800 m<sup>3</sup>. Phase 1 and Phase 2 are located on the south of the central drain and have been divided into 6 water supply zones as shown in figure below.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Figure 18: Water supply zones for Phase 1 and 2**

For Phase 3, water demand estimation including fire demand and losses is at 9.820 m<sup>3</sup>. Phase 3 is located on the north to the central drain and has been divided into 5 water supply zones as shown in the figure below:





(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Figure 19 Water supply zones for Phase 3**

#### 4.3.1.2.2. Wastewater management system

##### Design basis

The Project will be generating mostly 2 types of wastewater:

- domestic sewage from residential, facility and commercial areas, representing around 80% of domestic water consumption, representing an estimate of 650 m<sup>3</sup>;
- industrial effluent from the industries, around 70% of industrial water consumption, representing an estimate of 9,700 m<sup>3</sup>.

To manage these wastewaters, GDIZ will develop a complete wastewater collection and management network.

The wastewater collected from the collection network shall be treated through a range of operations to ensure the compliance of its disposal in compliance with the requirements recommended by the Benin regulatory authorities before they are discharged into the environment.

As pollution levels of domestic sewage are quite low comparative to industrials, 2 treatment systems are expected:

- domestic sewage is proposed to be treated in one domestic sewage treatment plant (STP);
- industrial effluents will be treated in 5 common effluent treatment plant (CETP).

Each of these plants will use various technologies depending on the incoming effluent quality, the type of treatment and the outcoming effluent quality. In both cases, after treatment the effluent will be discharged into the central drain of the overall water management system. It will be ensured that the effluent is treated to the disposable standards before it is discharged. Each industry will be required to treat its industrial wastewaters so that they reach standards established by GDIZ before releasing them into the CETPs. GDIZ will then treat these waters before releasing them into the central drain.

It is envisaged that the development of one STP and 5 CETPs shall be taken up in modules meeting the demands of the Project as development progresses.

The use of recycled water within the Project area is very low and the distribution of recycled water to the industries involves high pumping and is not cost effective. In view of this, the proposal of circulation of recycled water is not considered.

The main axis of the water treatment system for the management of the wastewater are developed below. However, further detailed technical studies have to be carried out to precise the wastewater system design and the adequate sizing of the proposed infrastructures.

### Wastewater zoning

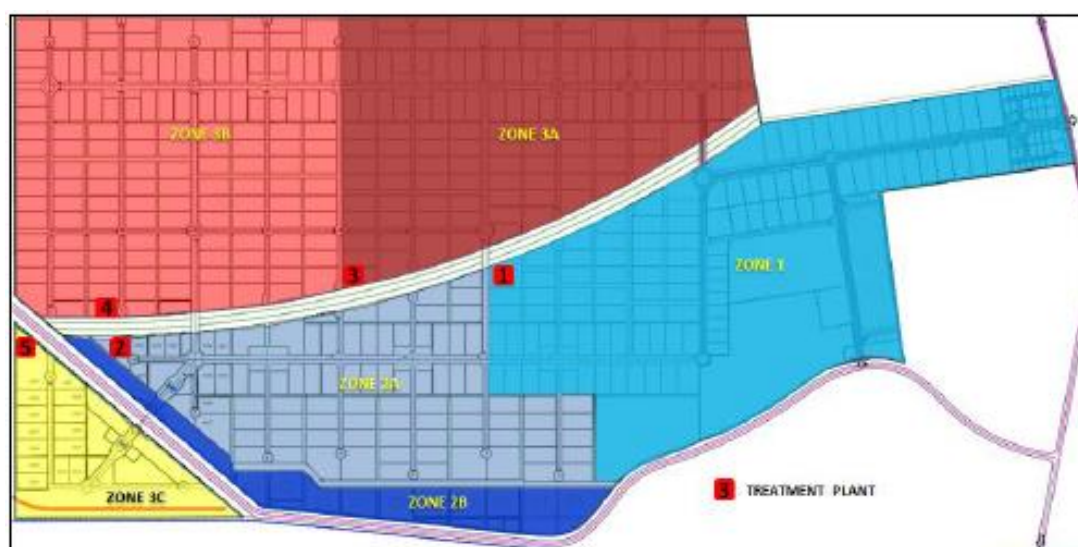
As for water supply, the site has been divided into wastewater zones depending on the zones' characteristics (topography, land use, wastewater quality). The expected wastewater generation and management for the different phases and zones of the Project is presented below.

**Table 12 Collection network details per day**

Zone name	Sewer network length m.	Phase No.	Water demand, m <sup>3</sup>	Wastewater generation, m <sup>3</sup>	Wastewater quality	Treatment facility
Zone -1	15,451.47	1 & 2	3,246.11	2,272.28	Industrial effluent	CETP
Zone- 2A	11,633.4	2	2,422.88	1,696.01	Industrial effluent	CETP
Zone- 2B	4,693.8	2	800.43	640.35	Domestic sewage	STP
Zone- 3A	12,020.6	3	3,703.52	2,592.46	Industrial effluent	CETP
Zone- 3B	14,041.4	3	4,308.18	3,015.72	Industrial effluent	CETP
Zone- 3C	3,402.75	3	171.53	1,20.07	Industrial effluent	CETP
<b>Total length</b>	<b>61,243.42</b>		<b>14,652.63</b>	<b>10,336.89</b>		

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

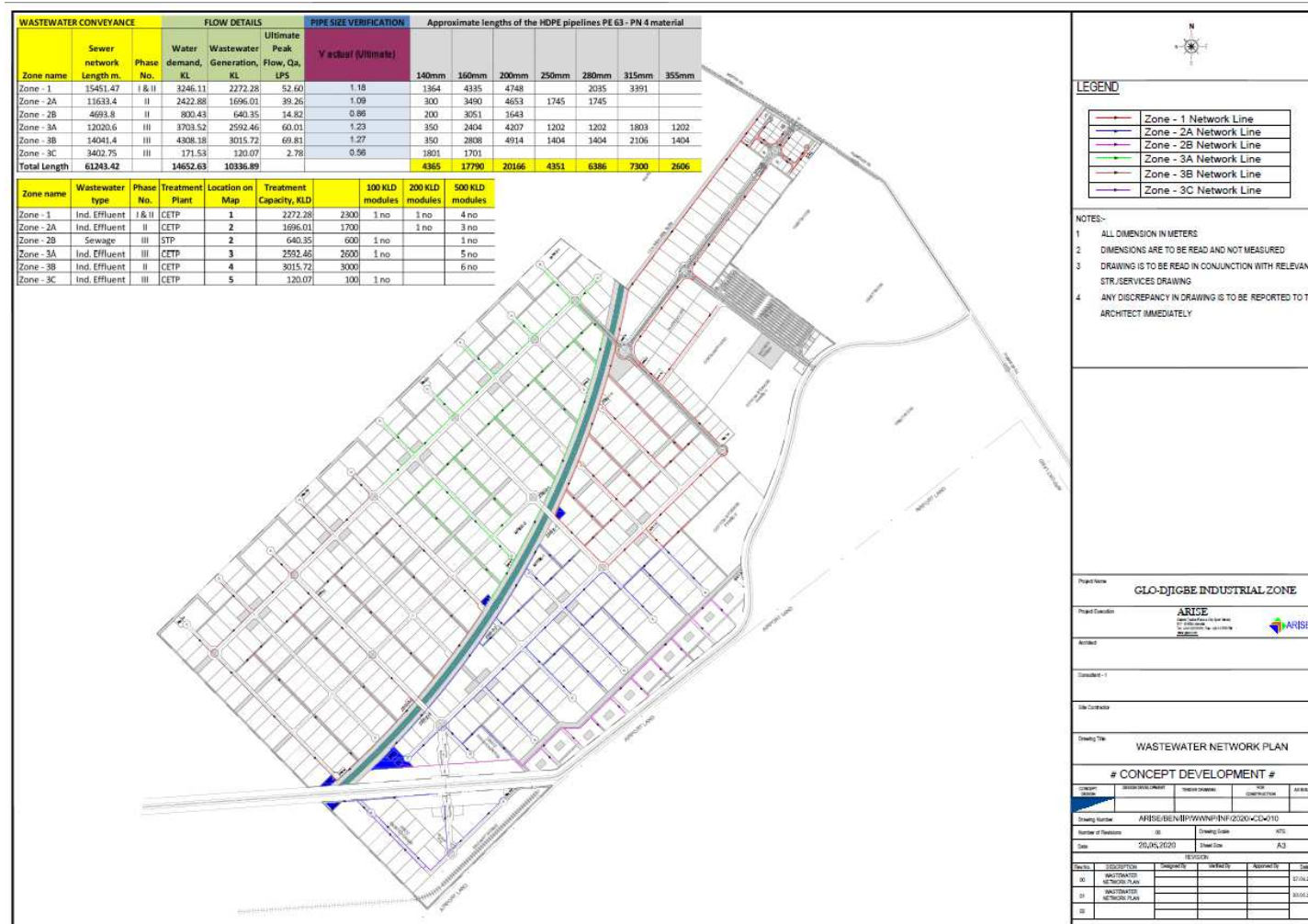
The map below presents the zoning system.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Figure 20 Wastewater zones and locations of treatment facilities**

All networks in a same area will be connected at one treatment facility (CETP or STP) as wastewater network plan presented in the figure below:



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Figure 21 Wastewater network plan**

### **Discharges parameters**

The characteristics of the industrial wastewater that will be produced on GDIZ will vary significantly depending on the type of industries and their industrial processes. Therefore, it is difficult to ascertain the typical quality of wastewaters discharged by the industry every day.

It will therefore be essential to prescribe a list of various parameters and the desirable quality standards that each industry needs to achieve prior to discharging the wastewater into the collection system for further treatment.

A study shall be undertaken separately, and a feasibility report shall be developed taking into account the different sector of industries envisaged in the Project area and primarily their pollutant characteristics at 2 levels *i.e.* pre-treatment and post-treatment. This will ensure that the treated effluent characteristics are well within the prescribed norms and treated water can be of disposable standards.

#### **4.3.1.2.3. Storm water management**

To reduce the transportation of pollutants to receiving water bodies, to manage flooding and avoid soil erosion, the 'disconnection' of constructed impervious areas from receiving water bodies and the reduction of the amount of constructed impervious areas will be proposed through the development of a drainage systems. Two types are expected:

- Major drainage system: open nallahs/ and natural surface drains.
- Minor drainage system: network of underground pipes and channels to collect water from the rainfall runoff and convey it to a discharge point (central drain).

Wastewater and storm drainage system will be separate systems.

A detailed drainage catchment study has been performed to understand the water dynamics in the watershed and takes into account runoff on the site, but also those from outside of the site.

The design Project foresees the application of the water sensitive urban design (WSUD) that manages rainfall runoff at the source using uniformly distributed decentralized micro-scale controls. WSUD concepts basically aims towards maintaining or restoring a more regional hydrological regime, such that the impact of urbanization on downstream flooding and water quality is minimized. The use of detention pond, retention pond, permeable pavement or swale must be included in the Project design to be in line with the WSUD.

The main axis of the drainage system for the management of the storm water and flooding are developed below. However, further detailed technical studies are in progress to precise the drainage system design and the adequate sizing of the proposed infrastructures.

### **Storm return period**

Considering the past historical meteorological conditions, a suitable intensity of rainfall will be considered for the design of the storm water drainage network. The frequency of storm for which the drains are to be designed depends on the importance of the area to be drained. Commercial and industrial areas must be subjected to less frequent flooding. The recommended design frequencies for use in simple design methods, as suggested in BS EN 752-2008 (AFNOR norm for drain and sewer systems outside buildings), are presented below.



Table 13 Design storm frequency

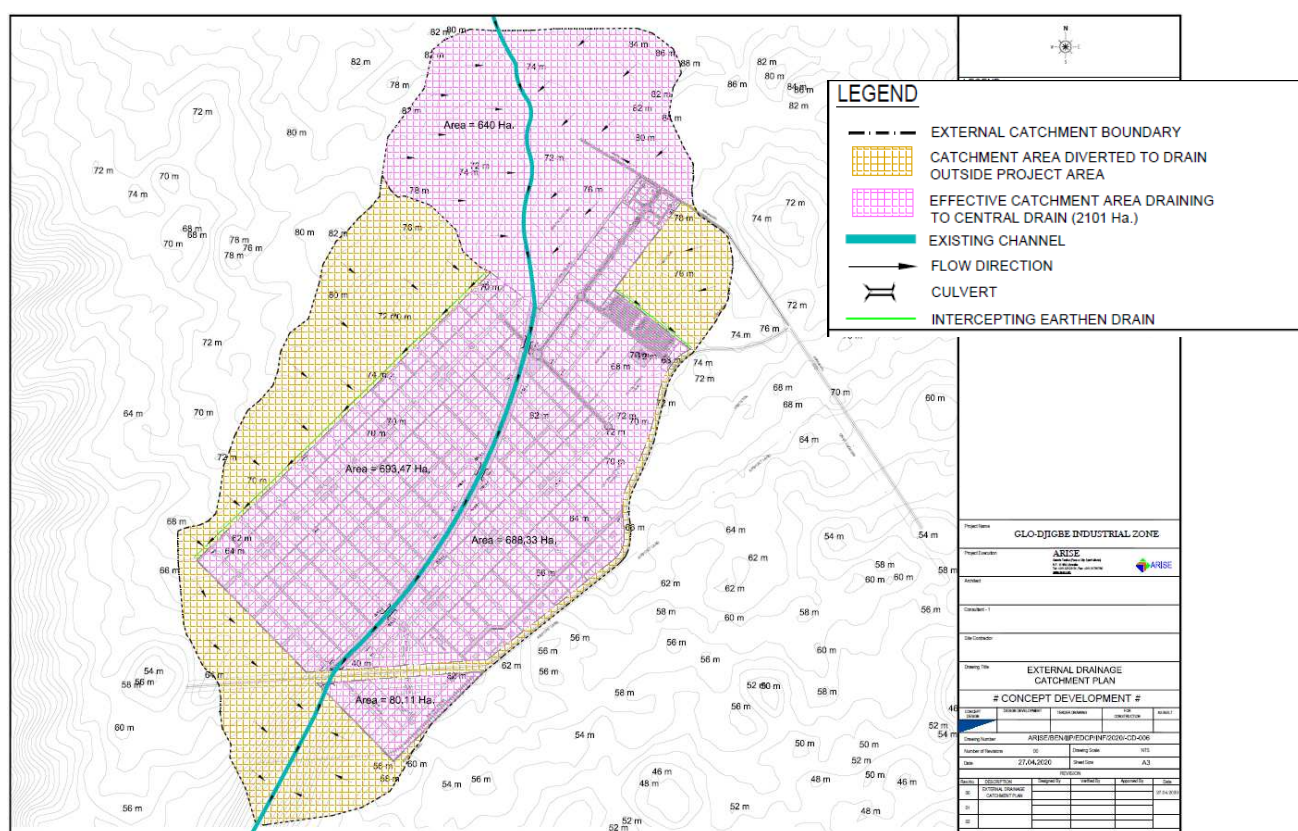
Location	Design Storm Frequency	
	Return Period ( 1 in “n” years)	Probability of exceeding in any 1 year
Rural Areas	1 in 1	100%
Residential Areas	1 in 2	50%
City centers /Industrial/ Commercial areas	1 in 5	20%
Underground railway / underpass	1 in 10	10%

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

### External catchment

In order to avoid a major contribution of external runoff waters on-site, these will be diverted in dedicated drains as the figure below shows. These drains are sized in order to receive the runoff of the external catchment area.

Two diversion drains approximately 1.5 m wide with 1.0 m deep along the Project boundaries will be constructed to collect the runoff to prevent the effect of inflows on the Project area drainage system. These diversion drains could be unlined earthen channels meant to receive the inflows and divert them to the lowest level outside the Project boundaries. The diversion channels/drains are shown in green colour line in the below figure.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

Figure 22 External drainage catchment area

### **Internal catchment**

A network of drains, cross drainage works, and other water sensitive urban design concepts will combinedly controls and manages the runoff generated (see figure below). The system has been sized to handle water from the 2,101-ha effective catchment area visible on the previous map.

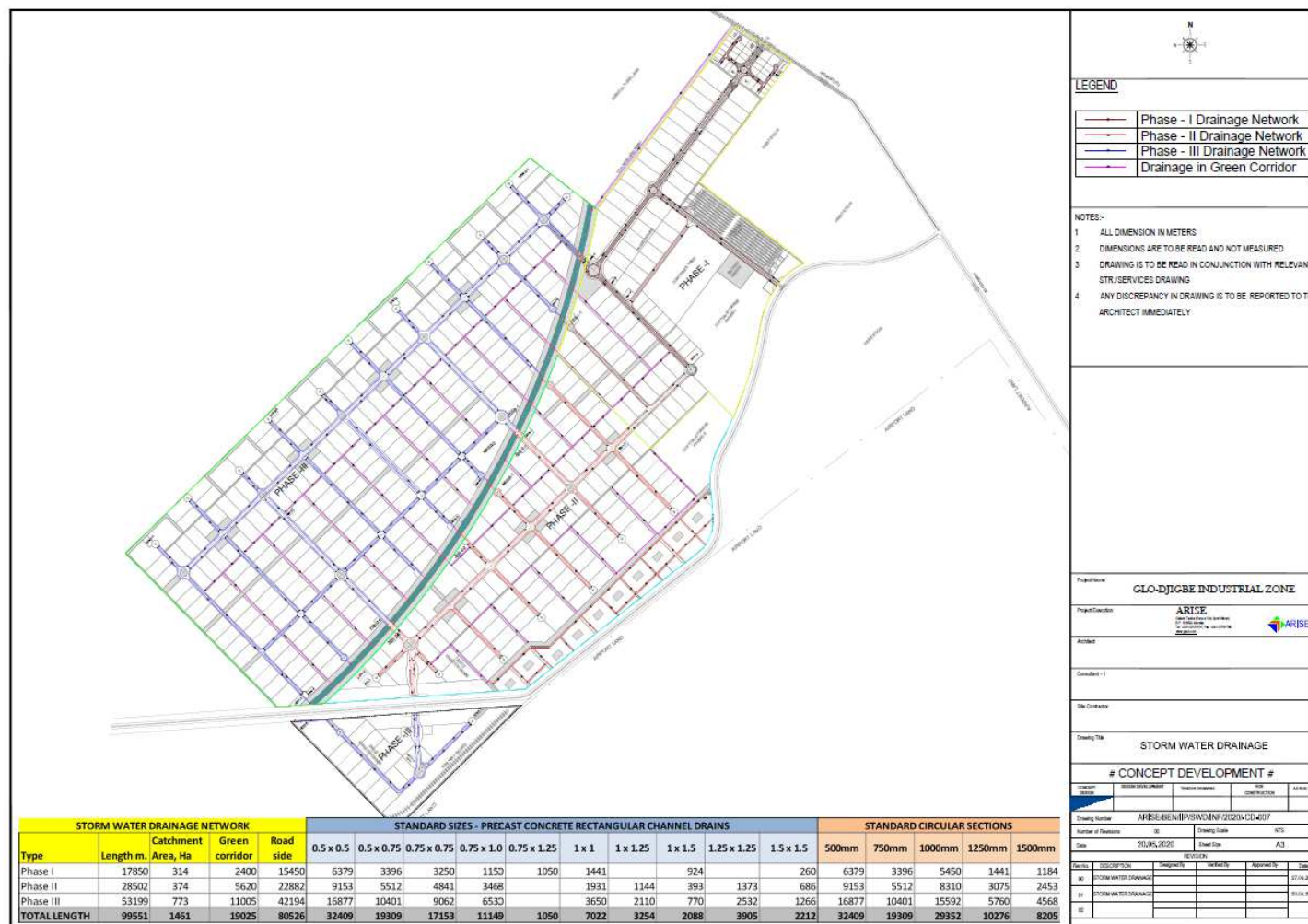
For the north part of the site and the site itself, the master plan has considered a central drain delineated by a 40 m wide green corridor on both sides along its length within the Project area. The central drain has given a width of 50m with 2m depth and 4.7 km-long. No permanent civil structures will be allowed to be built within the green corridor except for laying utility pipelines or cables.

The central drain will be an unlined earthen channel with stabilized side slopes. Natural grass or other available low-cost green turf can be installed within the drain section in order to reduce the soil erosion, control velocities, improves infiltration etc. No untreated wastewater or any other liquid waste will be allowed to enter or be dumped into the drain.

Other “sub-drains” will be developed, along the road and plot side. About 1.5m wide corridor is provided on both sides of the road to construct a storm water drain. The section of the drains could be a combination of rectangular channels and underground RCC pipelines with inspection chambers. All these “sub-drains” will be connected to the central drain and are planned to build a vegetated swale to collect the runoff generated and infiltrate thereafter within the premises.

Four major culverts will be constructed to maintain the continuity of the stream and to facilitate the connectivity between the 2 phases.

The proposed drainage network has multiple outfall locations that discharge runoff into the central drain. Each outfall location shall be designed to allow free flow with necessary bed protection measures to avoid soil erosion and related problems. Grates or nets can be fixed at ends to arrest the debris, other solid entering the central drain.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Figure 23: Storm water drainage network of the Project**



#### 4.3.1.3. Solid waste management system

The main objective of solid waste management is the minimization of waste to be sent to landfill. Every industry generates solid waste on daily basis which normally have to be stored at the source of waste generation until their collection for disposal. The types of waste generated in the industrial area can be divided into several categories, as shown in the figure below.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

Figure 24: Waste categories

#### Estimated waste generation

The total solid waste generation estimated for GDIZ is at 53,670 kg per day. This waste is assumed to contain 45% of bio-degradable waste (organic in nature), 40% of non-biodegradable and rest 15% of inert waste. The quantity of hazardous waste generated by industries will depend on the industry types and on their operational practices.

The expected hazardous waste in the proposed development includes spent oil, residues containing oil, spent carbon, catalyst, process residues, spent etching chemicals and solvents, discarded containers, barrels used for hazardous wastes, chemicals, and sludge generated from effluent treatment plant etc.

The biodegradable waste will consist of solid waste resulting from residential and commercial kitchens, agro industries, green sweepings, leaf litter, etc. The non-biodegradable waste will consist of recyclable waste fraction consisting of fiber, scrap, paper, cardboard, packaging, plastic, polythene, tin, glass and metal waste and a fraction on inert waste.

The total waste generation estimated for GDIZ is presented below.

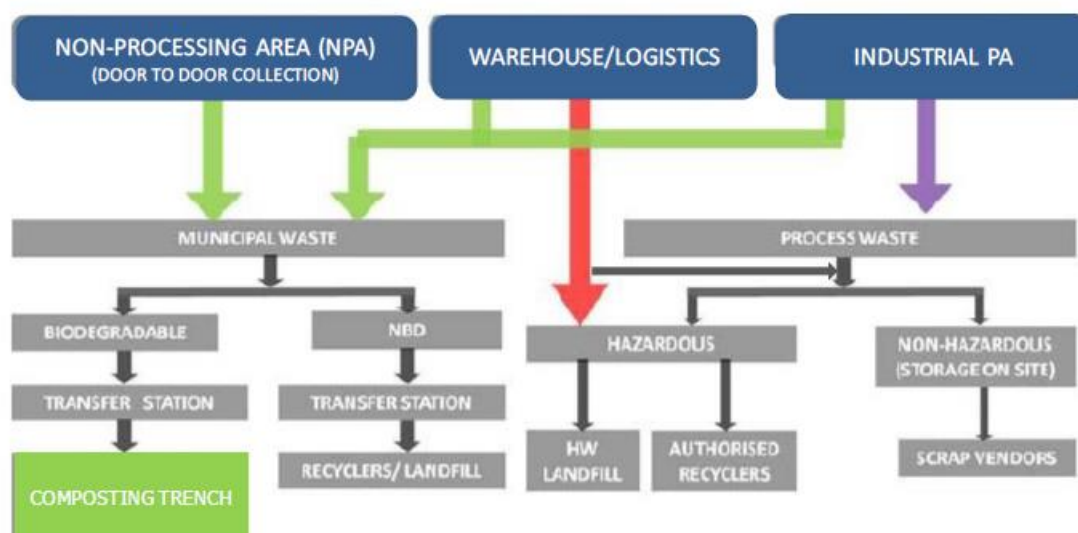
Table 14 Waste estimates for GDIZ

Landuse	Area	Total worker population	Solid waste generation assumption	Solid waste generation in GDIZ
Industrial	830.55	41527	@50.00 kg/day/ha	41527
Commercial	32.12	10370	@0.20 kg/day/person	2074
Warehouse & Logistic Facility	91.17	3039	@0.20 kg/day/person	608
Cotton Storage	32.12	676	@0.20 kg/day/person	135
Container Yard	71.61	1790	@0.20 kg/day/person	358
Residence	25.64	641	@0.20 kg/day/person	128
Green & Open	33.70	9391	@0.35 kg/day/person	3287
	150.07		@0.0037 kg/day/Sq.m	5553
<b>Total waste generated (Kg/day)</b>				<b>53,670</b>

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

## Waste Flow

The Project's waste flow will be originating from non-processing area (residential, commercial, admin, etc.) to facility area like warehouse, logistics and from industrial processing area). **Furthermore, it should be noted that the government will have to build a new landfill site or improve the current landfill site in order to accommodate for part of the GDIZ waste.**



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

Figure 25: Waste flow diagram in GDIZ

## Waste management strategy

GDIZ will follow a waste management strategy involving the different systems presented below.

- Waste segregation

The system is based on segregation at the source of non-biodegradable waste and biodegradable organic waste. The waste at source is stored in 2 bins of green and white color, with green bin for food waste/biodegradable waste and the white bin is for non-biodegradable wastes. The bins will be provided with closed lids either removable or sliding ones.

Initial collection of the solid waste generated by each industry will have to be done by the industry itself.

- Street sweepings

Street sweepings involve natural wastes, road traffic wastes, behavioural wastes and silt from open drainage wastes. Hand carts have been recommended for the collection of streets sweeping waste separately for processing as well as non-processing areas. Street sweepings will be transferred after collection to transfer station located within the GDIZ processing and non-processing area premises. In the case of manual sweeping in processing and non-processing premises, approximately 600 road meters will be covered by one street sweeper.

After the development of all phases, a mechanized street cleaning can be adopted. The proposed system is the "Vacuum Sweeper" that transfers waste from the street to the storage receptacle. The mecanized street cleaning is to be done on the major streets. These can carry a payload of 4-5 Tonnes of sweeping waste.

- Primary collection and transportation of waste

Primary collection is required to ensure that waste stored at the source is collected on a regular basis and it will be necessary to synchronize with waste storage at the source. Further, it reduces the generation of odour from the waste which increases with bio-degradable fraction putrefaction. Vehicles of capacity of 2m<sup>3</sup> will be used for transportation of waste from source to the transfer station.

- Decentralized transfer station

The transfer station concept proposed in GDIZ area is expected to ensure better control of storage depots. Seven transfer stations are proposed each in processing areas as well as in non-processing areas, and the area required for each transfer station will be approximatively 200 m<sup>2</sup>.

At transfer station, waste will be further segregated. Recyclable waste will be sold to the authorized vendors; biodegradable waste will be sent to the Composting Trench for usage in horticulture in green corridors and parks (they can also be use in agriculture area (where most raw materials are taken) for manures) while nonbiodegradable and non-recyclable waste will be directly sent to the landfill site facility.

Three containers painted green, white and black would collect segregated waste separately, biodegradable, recyclable and non-biodegradable waste respectively. The containers installed at each station can be loaded directly onto the transport vehicle or compactor truck, thereby preventing a multiple waste handling.

- Strategy for biodegradable waste

Composting system was adopted for GDIZ: compost normally takes 21 days to be done. The estimated amount of biodegradable waste generated for compost in GDIZ is presented below:

- Biodegradable waste generated per day: 24,15 Tons
- Percentage of biodegradable waste per day to be composted: 20%
- Quantity of biodegradable waste generated per day: 4,8 Tons
- Total quantity of biodegradable waste accumulated over a period of 21 days to be composted: 100 Tons

The biodegradable waste must be composted in a single spot. The compost trenches are distributed in two distinct locations according to the design. These locations are limited to the utility and green areas (location 1 and location 2 visible on the map below). In each composting trench, there are a total of 5 composting pits and the total area needed for these trenches including a 1,5-meter buffer is around 700 sqm.

The proposed locations of composting trench and transfer stations for segregation of waste are shown in the following figure.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

Figure 26 Location of 2 composting trenches and 7 transfer stations

#### 4.3.2. Common buildings

The common administrative buildings planned to be built are as follows:

##### **Single-Window Clearance (SWC) building**

The single-Window Clearance (SWC) building is a public service building that supports the needs of the industrial zone and house its administration and facility management, and its security, health and safety management. The building will also have the customs and the industry department representatives of the Government.

##### **Police station building**

The police station building is a public service building that will be built in order to enhance the safety and security of the IZ. The station is supposed to accommodate various functions for community policing as well as interrogation and detention of troublemakers.

##### **Fire station building**

The fire station is a public servicing building planned to serve the users of GDIZ. The design of the station has taken into consideration the time required for a firefighter to reach the apparatus and be ready for departure.

##### **Custom gate building**

The custom gate building is designed to provide a security check point as well as documentation of individuals and goods moving in and out of the GDIZ. It has 4 entrance lanes and 4 outgoing traffic lanes. The outer lanes of the building are dedicated to the movement of goods, while the inner lanes are to be used for both cars, buses and trucks when necessary.

### Other common infrastructures

To support the resident population in GDIZ area, the following social infrastructure requirement has been workout including the total area requirement as per international standards. The estimated total area required for support infrastructure is 5.2 Ha.

**Table 15 Support infrastructures**

S. No.	Facility	Guidelines		Land Area (sq.m.)/unit	Total Land Area (sq.m.)
		URDPFI	Adopted		
<b>1</b>	<b>Educational</b>				
1.1	Nursery School (excluding the PS and SS)	4	4	800	16,000
1.2	Primary school	2	2	4000	8,000
1.3	Sr. Secondary school	1	1	18,000	18,000
<b>2</b>	<b>Health</b>				
2.1	Dispensary	1	1	1,000	1,000
<b>3</b>	<b>Community facilities</b>				
3.1	Community Room	2	2	750	1,500
3.2	Community hall /library	1	1	2,000	2000
3.3	Religious Facilities (At neighbourhood)	2	2	400	400
<b>4</b>	<b>Public Amenities</b>				
4.1	Filling cum service station cum workshop	1	1	1,620	1,620
4.2	Sub fire station/ Fire Post	1	1	6,000	6,000
4.3	Fire station	1	1	10,000	10,000
	<b>Total</b>				<b>52,120</b>

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

### **4.3.3. Road infrastructures**

GDIZ Project area consists of approximately 44 km of proposed new road construction. The roads are classified based on their hierarchy and included as below:

- Arterial, sub-arterial and collector roads catering to logistic and industrial traffic. Arterial and sub-arterial roads shall contain the maximum traffic with most of the commercial heavy vehicles plying on these. The lane configuration are 6-lane divided carriageway and 4-lane divided carriageway proposed for the arterial and sub-arterial roads considering better manoeuvre of heavy commercial vehicles.
- Minor and major collector roads and local access roads for the residential and commercial development.

The road network hierarchy in GDIZ is presented here.



Table 16 Road types and key features

Road Type	Features	Length (KM)
60 m Arterial Road	8-lane / 6-lane Divided Carriageway with 4 lanes / 3 lanes and 2.0m footpath on each side.	2.63
45 m Arterial/ Sub-arterial Road	6-lane / 4-lane Divided carriageway with 3 lanes / 2 lanes, 2.50m parking and 2.0m footpath on each side.	14.14
30 m collector Road	4 lane divided carriageway with 2.50m parking, 2.0m footpath on each side.	21.35
24 m local street	Dual Carriageway with 2.0m footpath with 2.50m parking, on each side.	1.42
12 m local street	Residential streets	4.65
Overall Length of all roads		44.19

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

The map shows the location of these roads.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

Figure 27 Road hierarchy and location



The traffic proposed to use these roads is estimated as below.

**Table 17 Estimated traffic**

Type of Roads	Estimated Traffic	
Arterial Entrance roads	15120	PCU
Sub-arterial & Collector roads	13791	PCU (over 3 phases)

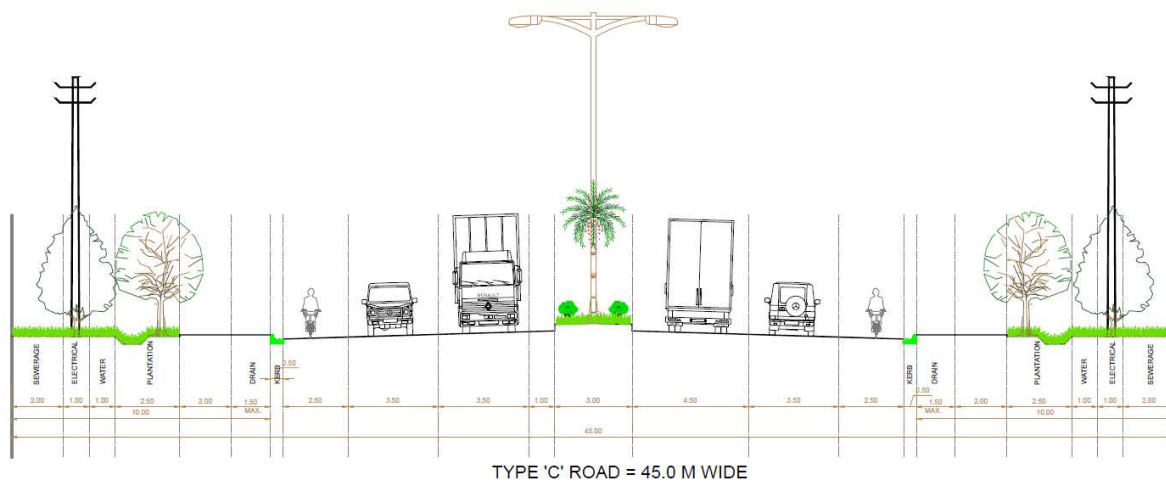
(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

Typical cross section of each type of road will have the following design.



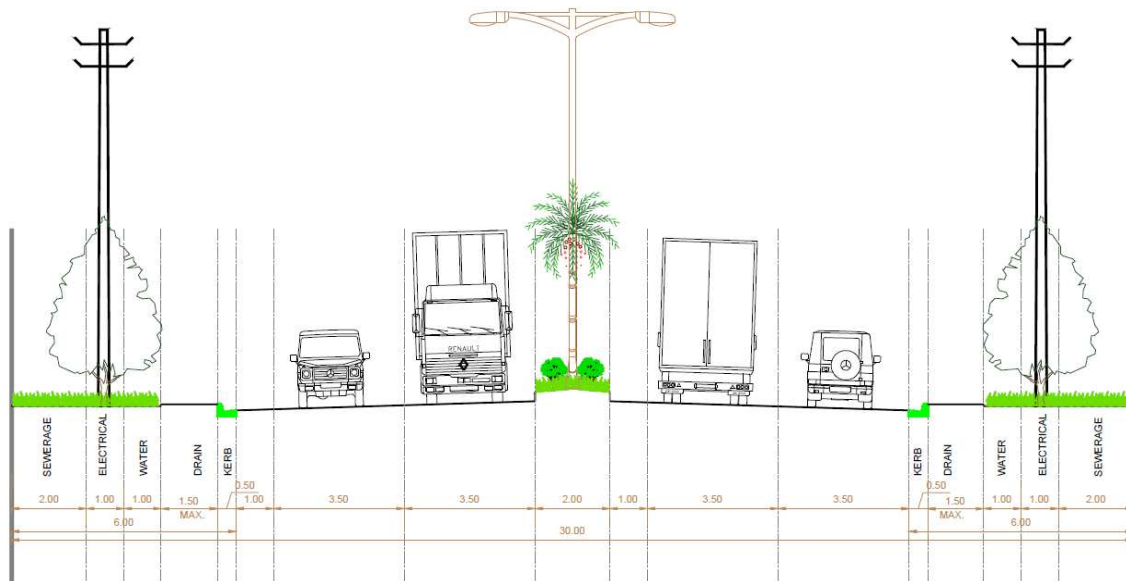
(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Figure 28 Typical cross section 60m ROW**



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Figure 29 Typical cross section 45m ROW**



TYPE 'E' ROAD = 30.0 M WIDE

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

Figure 30 Typical cross section 30m ROW

#### 4.4. Associated facilities

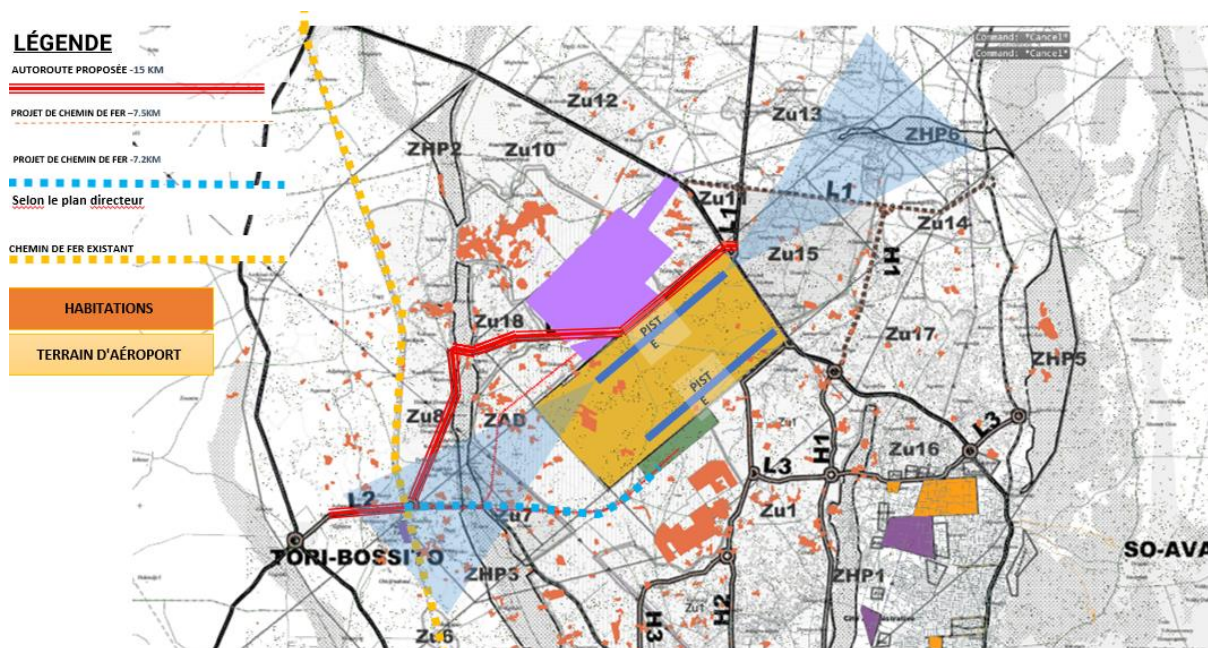
The World Bank refers, in its article n°11 of ESS1, to "associated facilities" as facilities or activities over which the operator has control or influence, which are not financed under the Project, but which are:

- 1° directly and closely associated with the Project;
- 2° carried out or to be carried out at the same time as the Project, and;
- 3° necessary for the viability of the Project and would not have been built, expanded or carried out in the absence of the Project.

These associated facilities have to be in compliance with international standards, as is the case of the current Project.

Four facilities are analyzed to determine whether they meet World Bank criteria:

- a landfill either through extension of an existing landfill or building of a new one by the Government to accommodate Project waste;
- a power line connecting the Project substation to an existing substation, the route of which has not yet been defined;
- a 15 km-long motorway to serve both the airport and the IZ, to be built from the existing road to the municipality of Tori-Bossito (see figure below);
- a 7.5 km long railway to be built from the existing railway passing through Tori-Gare, a locality in the municipality of Tori-Bossito (see Figure below).



(Source: ARISE, 2019)

Figure 31 : Plan of the new access roads (road and rail) to the airport and GDIZ

The analysis of these facilities is presented in the following table. According to this table, the landfill and the power line connecting the Project substation to an existing substation are associated facilities.

Table 18 : Determination of associated infrastructure

Installation	Control of the installation	Funding	Direct association with the Project	Carried out at the same time as the Project	Necessary for Project sustainability	Associated installation
Landfill	Indirectly via the Government of Benin	Government of Benin	Yes	Yes	Yes	Yes
Power line	Indirectly via the Government of Benin	Government of Benin	Yes	Yes	Yes	Yes
Highway	None	Government of Benin	Yes	No	No	No
Railway	None	Government of Benin	Yes	No	No	No

Consequently, the proponent will have to monitor the environmental and social impact assessment process for the construction of the power line connecting the industrial zone to the substation.

This line, like the construction of the highway and railway, will have to be subject to dedicated ESIAs. As the line route is not yet available, main principles in terms of environmental and social concerns will be proposed in this ESIA.

## 4.5. Project development stages

The major phases of Project development can be divided into preparation, construction and operation, as presented in the following table.

Table 19 : Stages of the Project

Stages	Activities
Preparation	Site Delineation
	Technico-economic and financial studies
	Environmental studies (Environmental and social impact assessment (ESIA) and Environmental and social management plan (ESMP))
	Social studies: Resettlement action plan (RAP), expropriation and compensation for persons residing or engaged in economic activities on the area
	Securing the site's land tenure (issuance of the Land Title deed)
Construction	Vegetation cutting, clearing and de-vegetation, followed by excavation of surface soil layers and earthworks in the areas
	Servicing with the construction of access roads, sewage drainage, boreholes and water and electricity distribution network
	Equipment of the reception site and construction of buildings and structures common to future users of the area (electrical substations, treatment plant, administrative buildings - offices, infirmaries, dormitories, etc.).
Operations	The IZ is put into operation and the first industrial operators are welcomed.
	Expansion of the IZ to accommodate new operators

### 4.5.1. Construction phase

Construction will be undertaken in phases and Project proponent will ensure:

- Authorisation for construction.
- Access to the land in phases with assurance on the inventory of the Project affected Persons, RAP and compensation in place as per planned access to the Site.
- An IFC-Standard compliant ESIA Report and its disclosure.

Land clearing, excavation and earthworks will be conducted only on the area of proposed construction and in phases. For e.g., only 20 ha of land will be targeted for development in the first 6 months and subsequently the development will be extended to the areas as needed to facilitate the investors interested in the zone. There is technically no earthwork required in the Project except focused excavations required for the construction of the roads or the buildings. Moreover, the cut-fill requirement of the construction shall be locally balanced. Only the width of the proposed roads will be asphalted.

The other infrastructure like drainage system, sewage system, water supply network, electrical networks shall be constructed also in phases as per the development plan. The proposed facility buildings and structures like water tank, sub-stations, etc. shall be constructed in the early Phase-1 stage to ensure the proper functioning of the proposed development. The cement will be supplied by an external contractor and there will be no cement plant on the site. The construction materials will come from existing and authorized quarries.

The construction contractor(s) have not been selected yet.

#### **4.5.1.1. Employment and workers accommodation**

Construction activities will employ an estimated 1,000 workers at peak. During the construction phase, which is expected to last 2 years, the main jobs will concern:

- workers to carry out the activities of land servicing and construction of different types of buildings;
- specialized craftsmen (electricians, masons, plumbers, carpenters) to carry out certain stages of the construction of buildings and the installation of water and electricity supply networks;
- drivers of construction site machinery;
- guards and security guards to secure the construction site during and outside the work period;
- site management personnel: site supervisors, HSE supervisor, etc.;
- civil engineers and technicians;
- site management staff (works manager, technical director).

The profiles sought will require varying levels of qualification ranging from no qualifications for general workers, technical training for specialised craftsmen to higher education qualifications for engineers and managers. Jobs for unskilled and semi-skilled personnel will be the most numerous.

Most of these jobs will be filled by nationals, while some of the jobs (mainly supervisory) will be filled by expatriate staff.

During the construction phases, workers will not be housed on site, which excludes the presence of residential living quarters and on-site recruitment. Work is to be executed through external contractors and labours housing (outside Project area) will be under their responsibility and will be defined at the contractors' selection phase. Workers will be transported by bus by their employers from their base camp.

However, a work area with daily living quarters will be set up close to the site during the construction phase to accommodate the offices of the construction companies as well as health facilities for the workers. The work area will also include storage area, equipment and engine maintenance and washing area.

#### **4.5.2. Operation phase**

The operational phase will involve the use of GDIZ shared utilities (energy, water, waste) and common infrastructure as well as daily operations of the various industries which rent a plot at GDIZ. GDIZ is expected to provide a direct employment of 12,000 workers and an indirect employment of between 42 and 58,000 workers at the best of its operation. GDIZ is also planned to have a residential population of approximately 10,000 people which will be primarily working within the zone and would enjoy living in close vicinity of their workplace. The development is planned on WORK\_LIVE\_PLAY concept.



The operational phase of the zone shall witness the full exploitation of the created infrastructure and also the operation of the industries. The expected operations shall create an impact by the utilisation of the resources (energy, water, raw materials) thereby resulting in emissions as well as solid/liquid waste including noise and other atmospheric emissions which will need mitigations measures for control of the adverse impacts due to the operation of the zone.

The facility buildings, structures and the industries shall be accessible to the investors, workers and visitors within the zone, including the green and open spaces. Besides, the facility buildings like fire-station and police station shall be a great relief to the man and material within the zone by ensuring security and safety including emergency responses within the zone for its users. GDIZ and industries' personnel will have access to the dispensary and schools including other community services that will be developed along with the demand of the population in later development stages.

## 4.6. Schedule

The GDIZ Project is expected to be conducted on 3 phases, spread over 8 years, as the following table shows it.

Table 18 Schedule

SN	Phases	Area (Ha)	Timeline (in years)
1	Phase 1	313.97	2 years
2	Phase 2	374.38	3 to 5 years
3	Phase 3	773.59	6 to 8 years
	Total	1,461.94	8 years

Phase 1 will be developed in 2 years. Construction is expected to start in December 2020 and will last 24 months, being completed on December 2022.

Commissioning is scheduled for the fourth quarter of 2022 and a start of operations in the first quarter of 2023.

To date, only phase 1 schedule is available.

## 4.7. Estimates of consumption, emissions and discharges

The table below presents an estimate of the nature and volume of consumption, emissions and discharges in construction and operation phases.



Table 19 Estimate of consumption, emissions and discharges in construction and exploitation phases

Category	Construction	Operation
Water and energy consumption	<p>Water needs for the works activities (concrete fabrication, washing vehicles, watering the tracks, drinking water, etc.) is not yet known, but based on hypothesis conventionally used, it is possible to estimate the following consumption:</p> <ul style="list-style-type: none"> <li>consumption of around 10 m<sup>3</sup> / day for civil works activities;</li> <li>a specific consumption of 50 L / person / day.</li> </ul> <p>Diesel will be used for the operation of the machines (vehicles, generators). Required volumes of diesel are not known at this stage.</p>	Estimates detailed respectively in section 4.3.1.2.1 (water) and 4.3.1.1 (energy)
Atmospheric emissions	<p>Expected atmospheric emissions are those typically observed for civil works activities and are:</p> <ul style="list-style-type: none"> <li>dust caused by earthmoving and excavation, and the traffic of construction machinery;</li> <li>exhaust emissions from construction machinery;</li> <li>asphalt plants that will produce volatile compounds</li> </ul>	In the operating phase, each industrial unit with sources of atmospheric emissions (manufacture of building materials, plastics, etc.) will study their impacts in a dedicated impact study. The exact nature and volumes of these emissions are unknown at this stage, as the future industries and plants are not yet defined.

Category	Construction	Operation
Noise, light and odour emissions	<p>Nuisances identified for the construction phase are mainly linked to typical nuisances from civil works activities. They mostly come from:</p> <ul style="list-style-type: none"> <li>increased road traffic;</li> <li>dust due to road traffic;</li> <li>increased noise and the risk of road accidents;</li> <li>noise from pile driving and other construction operations;</li> <li>light if working at night or in conditions of limited natural lighting</li> </ul>	<p>Light emissions will come from the night lighting of the site during the operation phase.</p> <p>Olfactory emissions could be generated by the wastewater treatment process (if existing) and by the production units depending on the activities operated.</p> <p>The exact nature of these nuisances is unknown at this stage, as the future industries and plants are not yet defined</p>
Liquid discharges and waste water	<p>Liquid discharges expected during the construction phase are conventionally as follows:</p> <ul style="list-style-type: none"> <li>domestic effluents: from sanitary facilities and treated in a septic tank;</li> <li>water collected from vehicles washing and treated via sediment trap and oil separator.</li> </ul>	<p>Estimates of wastewater production detailed in section 4.3.1.2.2.</p>
Waste generation	<p>During construction, 2 main sources of waste are identified:</p> <ul style="list-style-type: none"> <li>works waste, related to earthworks, packaging, etc.;</li> <li>domestic waste linked to the presence of workers on the site considering a production of 0.62 kg / person / day and a density of around 700 kg / m<sup>3</sup>.</li> </ul> <p>Construction waste are generated by construction/demolition activities. This waste consists mostly of inert and non-biodegradable material and they generally occupy considerable storage space either on the road or communal waste/bin container.</p>	<p>Estimates of waste production detailed in section 4.3.1.3.</p>

Category	Construction	Operation
	Other expected construction waste and their typical disposal are presented below: canteen, horticulture and agro-processing waste, plastic bottles, gunny bags, cardboard sheets, glass bottles, metallic drums, fiber drums, wood waste.	
Dangerous materials	Construction work will involve the handling of chemicals (paints, solvents) corresponding to hazardous materials.	During operation, hazardous materials may also be used or produced according to the industrial processes of future operators. The exact nature and volumes of these materials are unknown at this stage, as the future industries and plants are not yet defined.

## 4.8. Summary of Project key figures

The table below presents a summary of the main key figures of the Project.

**Table 20 : Key figures of the Project in construction (phase 1) and in operation**

Themes	Data
<b>Construction phase<sup>3</sup></b>	
Construction period (phase 1)	2 years (24 months)
Jobs on the construction site (phase 1)	1,000 (estimate at peak period)
Areas to be cleared	Cleared: 313.97 ha
Estimated water consumption (phase 1)	31,680 m <sup>3</sup>
Estimated waste generation (phase 1)	468 m <sup>3</sup>
<b>Operation phase</b>	
Site area, Incl.	1,462 ha
Green and open spaces	150 ha (10,26%)
Road	162.73 ha (11,13%)
Facility (GDIZ Utilities)	32.12 ha (2,20 %)
Length of roads	44.19 km
60m-wide	2.63 km
45m-wide	14.14 km
30m-wide	21.35 km
24m-wide	1.42 km
12m-wide	4.65 km
Asphalte surface	162.73 ha
Electricity supply system	107 megawatts
Ground water supply	18,000 m <sup>3</sup> per day
Number of boreholes	Around 200 boreholes, at 9.3 m <sup>3</sup> /h
Length of water supply network	69.3 km
Wastewater treatment unit	5 CETP and 1 STP
Estimated wastewater	10.4 Mm <sup>3</sup> per day
Domestic sewage	650 m <sup>3</sup> per day
Industrial effluent	9,700 m <sup>3</sup> per day
Length of wastewater network	61.2 km
Length of storm water drainage	99.5 km
Including the central drain	4.7 km
Estimated waste production	53,670 kg per day
Jobs (direct employment)	11,609

(Source: Antea, compilation of data ARISE, 2020)

<sup>3</sup> Because of the construction works are expected to be performed phase by phase and no information is yet available on phase 2 and 3 's logistics, all key figures related to workers are assessed only on the phase 1 basis.

## 4.9. Impact factors

The Project, as described in the selected variant, is likely to produce impacts on the human and physical environments as well as on the biological environment. Indeed, at all phases of the Project (preparation, construction, operation and/or decommissioning phases), the activities that will be carried out are likely to modify the various components of the environment in which they are carried out. They are therefore presented here as "sources of impact" and will serve as input data for the impact analysis.

**Table 21 : Impact factors**

Impact factor	Description
<b>Preparation phase</b>	
Project land occupation	Changes in land occupation Permanent and temporary land occupation by the Project site and its access points, leading to expropriation of land from landowners and users
<b>Construction phase</b>	
Civil works, including access road & drilling	Clearing activities, earthworks, concrete production, runoff disturbance and soil erosion
Traffic	Traffic with the mobilization of site machinery, materials and equipment and works Accident with another vehicle or pedestrian
Atmospheric emission	Earthworks, construction works and traffic implying dust production, greenhouse gas and noise
Solid waste production	Clearing activities and earthworks: production of green and inert waste Construction works: hazardous and non-hazardous waste Workers accommodation: domestics waste
Liquid discharges production	Construction works: water from vehicles washing / concrete production process / oil separator Workers accommodation: domestics effluents (black and grey water)
Resources consumption	Works area and base camp functioning imply raw material consumption: water, oil, food products, etc.
<b>Operation phase</b>	
Presence of GDIZ	Permanent land occupation, visual aspect and landscape, soil sealing
Atmospheric emission	Functioning of GDIZ: greenhouse gas with traffic and electrical substation and noise with traffic, electrical substation, pumps, odor with treatment plant and solid waste, specific industrial emissions
Solid waste production	Functioning of GDIZ: domestic waste from GDIZ administrative building, green waste from open spaces, specific industrial waste
Liquid discharges production	Functioning of GDIZ: domestic effluents from GDIZ administrative building, runoff water, sludge from treatment plants and drainage networks dredging, specific industrial effluents Discharges in the central drain
Resources consumption	GDIZ administrative building functioning implies raw material consumption: water, oil, food products, etc. GDIZ utilities imply raw material consumption: water, hazardous material (chemical products, oil, solvent, etc.), etc.

Impact factor	Description
	Specific raw material for future industrial plants.
Traffic	Traffic on-site and to the site Accident with another vehicle or pedestrian
Employment	Job creation for the GDIZ common infrastructures and through the development of each industrial/commercial activities
Accidental situation	Industrial risks related to their process functioning in degraded mode operation
<b>Decommissioning phase</b>	
Employment	Selection of sub-contracting companies in charge of dismantling works Dismissal of industrial workers before proceeding with the demolition of infrastructures
Atmospheric emission	Decommissioning: greenhouse gas, dust and noise with dismantling activities
Solid waste production	Decommissioning: domestic waste, green waste, hazardous and non-hazardous waste, inert waste
Liquid discharges production	Decommissioning: water from vehicles washing / oil separator, industrial effluents, etc. Workers accommodation: domestics effluents (black and grey water)



## 5. Analysis of alternatives

The role of alternative analysis is to find the most effective way of meeting the need and purpose of the Project, either through enhancing the environmental benefits of the proposed activity, and or through reducing or avoiding potentially significant negative impacts.

During the design of the Project, several location alternatives have been studied by the government actors in charge of the Project with the objective to select the option the most “practicable”, “feasible”, “relevant”, “reasonable” and “viable” in terms of environment, social, technical and financial aspects.

To conduct this exercise, the identification and analysis of alternatives has been carried out following a multi-criteria analysis approach for each site location.

Five locations have been assessed, and for each one, environmental and socio-economic criteria such as the need for relocation of villages, direct access to RNIE 2 and relevance (suitability and compatibility of the option with community priorities) have been studied.

### 5.1. Identification and description of alternatives

#### 5.1.1. Initial option: Project site located south-west of the airport

The first location was the one proposed in the figure below shaded in orange which is between the flight path funnel (blue shaded area) and the surface transition zone (green shaded area) of the future airport. These 2 areas are critical with respect to ICAO Aircraft Safety Rules: tall and large structures in the direction of the flight path are not allowed. For example, industrial chimneys because of their size are forbidden because they may be dangerous to the movement of the aircraft due to smokes coming out of chimney.

→ The aviation safety norms have critical restrictions on the industrial development within the blue area. That is why this option was removed.

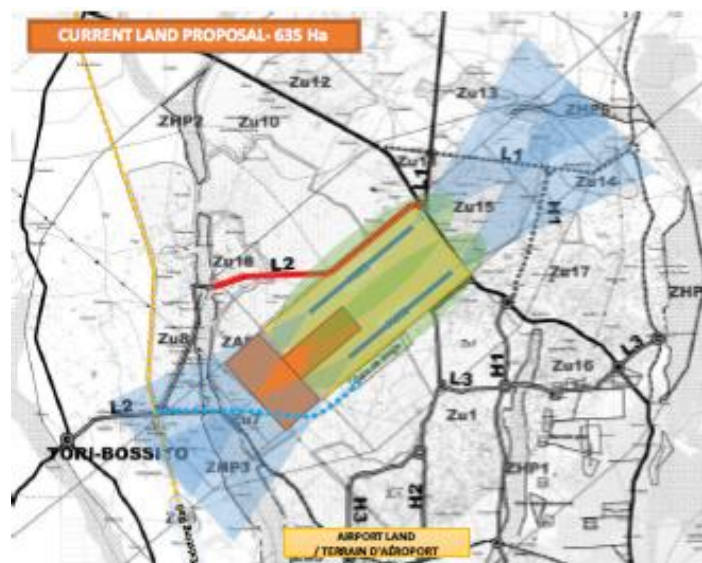


Figure 32 Option 1 - not retained

### 5.1.2. Option 1: Project site located west of the Glo-Djigbe airport site (municipality of Tori-Bossito)

The Project option 1 was located as shown below.

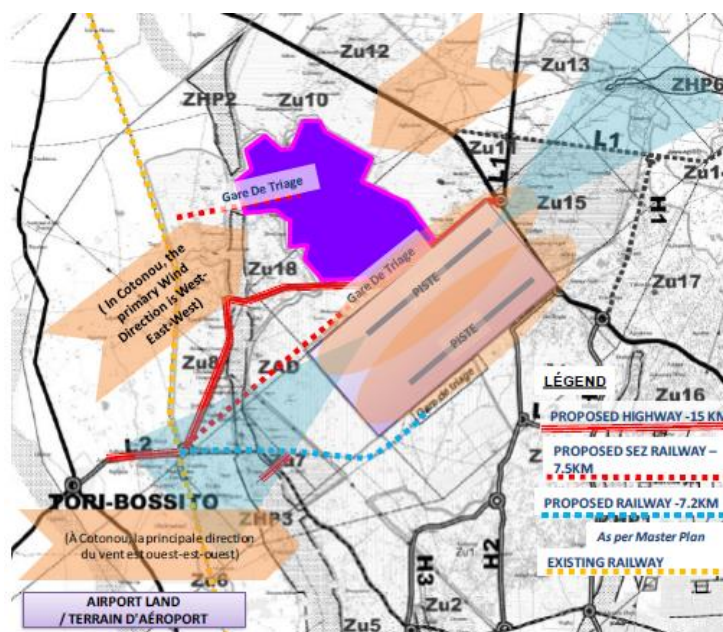


Figure 33 Option 1 - not retained

A comparison of strengths and constraints of this area has been done in the table below.

Table 22 : Strengths and constraints analysis for option 1

Criteria	Strengths	Constraints
Environmental	<ul style="list-style-type: none"> <li>- No land in the flight path</li> <li>- No threat aircraft operation due to smokes released in the Environment from the chimneys because of the wind direction</li> </ul>	<ul style="list-style-type: none"> <li>- Remote site of RNIE2</li> <li>- Colonization of a new space</li> <li>- Modification of the receiving environment</li> <li>- Destruction of fauna and flora</li> <li>- Crossing of the Lama depression (wetland) required to access the site</li> </ul>
Socio-economic	<ul style="list-style-type: none"> <li>- Creation of various jobs</li> <li>- Industrial development of the area</li> <li>- Income for owners of acquired land</li> <li>- Development of small businesses for women</li> <li>- Domestic availability of new products</li> </ul>	<ul style="list-style-type: none"> <li>- Expropriation of land</li> <li>- Relocation of the 2 villages of Kindji and Hetin-Yenawa</li> <li>- Loss of property</li> <li>- Loss of agricultural crops</li> <li>- Land conflict management risk</li> <li>- Impact on traffic</li> <li>- Pineapple production reduction</li> <li>- High investment cost due to the relocation of village centres and the opening and development of access roads.</li> </ul>

### 5.1.3. Option 2: Project site located south-east of the Glo-Djigbe airport site (municipality of Abomey-Calavi)

The Project option 2 was proposed as below.

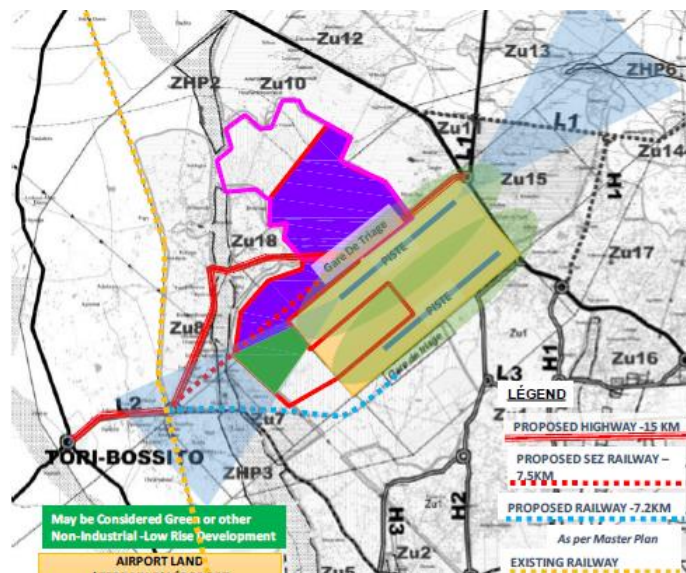


Figure 34 Option 2 - not retained

A comparison of strengths and constraints of this area has been done in the table below.

Table 23 : Strengths and constraints analysis for option 2

Criteria	Strengths	Constraints
Environmental	<ul style="list-style-type: none"> <li>- No land in the flight path</li> <li>- No threat to aircraft operation due to smokes released in the Environment from the chimneys because of the wind direction</li> </ul>	<ul style="list-style-type: none"> <li>- Proposed Highway splits the land into 2 parts</li> <li>- Remote site of RNIE2</li> <li>- Occupancy of the Airport relocation site</li> <li>- Colonization of a new space</li> <li>- Modification of the receiving environment</li> <li>- Destruction of fauna and flora</li> </ul>
Socio-economic	<ul style="list-style-type: none"> <li>- Creation of various jobs</li> <li>- Industrial development of the area</li> <li>- Income for owners of acquired land</li> <li>- Development of small businesses for women</li> <li>- National availability of new products</li> </ul>	<ul style="list-style-type: none"> <li>- Expropriation of land</li> <li>- Displacement of the 2 villages of Dokanme, Hla</li> <li>- Loss of property</li> <li>- Loss of agricultural crops</li> <li>- Land conflict management risk</li> <li>- Pineapple production reduction</li> <li>- High investment cost due to the displacement of village nuclei and the compensation of the affected population.</li> </ul>

#### 5.1.4. Option 3: Project site located to the north-west of the airport (district of Tori- Cada)

The Project option 3 was proposed as below.

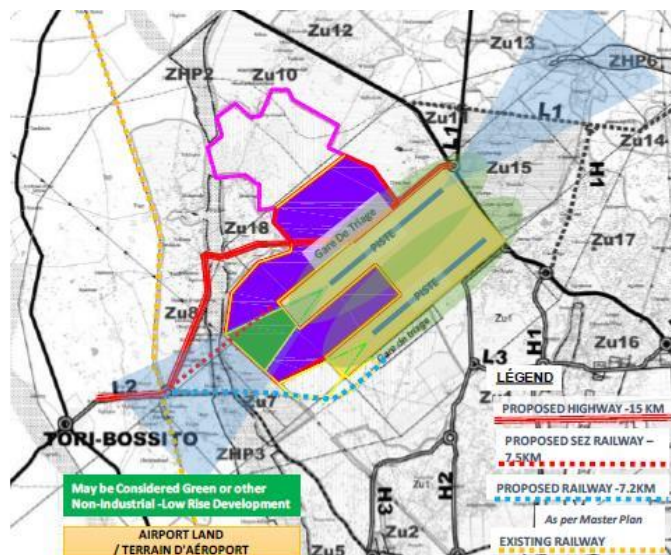


Figure 35 Option 3 - not retained

A comparison of strengths and constraints of this area has been done in the table below.

Table 24 : Strenghts and constraints analysis for option 3

Criteria	Strengths	Constraints
Environmental	<ul style="list-style-type: none"> <li>- No land in the flight path</li> <li>- No threat aircraft operation due to smokes released in the Environment from the chimneys because of the wind direction</li> </ul>	<ul style="list-style-type: none"> <li>- Crossing the Llama Depression</li> <li>- Watercourse Crossing</li> <li>- Restrictions with regards to Surface Transition and flight paths</li> <li>- Discontinuous land</li> </ul>
Socio-economic	<ul style="list-style-type: none"> <li>- Creation of various jobs</li> <li>- Industrial development of the area</li> <li>- Income for owners of acquired land</li> <li>- Development of small businesses for women</li> <li>- Domestic availability of new products</li> </ul>	<ul style="list-style-type: none"> <li>- Expropriation of land</li> <li>- Displacement of the 2 villages of Dokanme, Hla</li> <li>- Loss of property</li> <li>- Loss of agricultural crops</li> <li>- Land conflict management risk</li> <li>- Pineapple production reduction</li> <li>- High investment cost due to the relocation of village centres and the opening and development of access roads.</li> </ul>



### 5.1.5. Option 4: Project site located north of the airport (district of Sekou)

The Project option 4 was proposed as below.

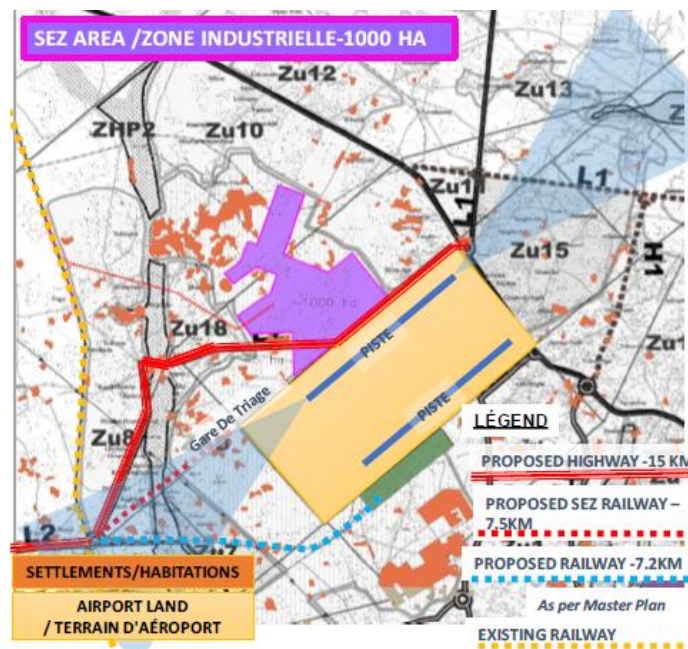


Figure 36 Option 4 - not retained

A comparison of strengths and constraints of this area has been done in the table below.

Table 25 : Strenghts and constraints analysis for option 4

Criteria	Strengths	Constraints
Environmental	<ul style="list-style-type: none"> <li>- No land in the flight path</li> <li>- No threat aircraft operation due to smokes released in the Environment from the chimneys because of the wind direction</li> </ul>	<ul style="list-style-type: none"> <li>- Changing the landscape configuration</li> <li>- Loss of wildlife habitat</li> <li>- Proposed Highway splits the land into 2 parts</li> </ul>
Socio-economic	<ul style="list-style-type: none"> <li>- Avoid large number of inhabited areas</li> </ul>	<ul style="list-style-type: none"> <li>- Expropriation of land</li> <li>- Relocation of a few isolated buildings</li> <li>- Loss of property</li> <li>- Loss of agricultural crops</li> <li>- Land conflict management risk</li> <li>- Pineapple production reduction</li> <li>- High investment cost due to the relocation of the village centres of Wibatin and Vehoui and the compensation of the affected population.</li> </ul>

### 5.1.6. Option 5: Project site located northeast of the airport (districts of Tori- Cada in Tori-Bossito and Tangbo-Djevie in Ze)

The Project option 5 was located as below.

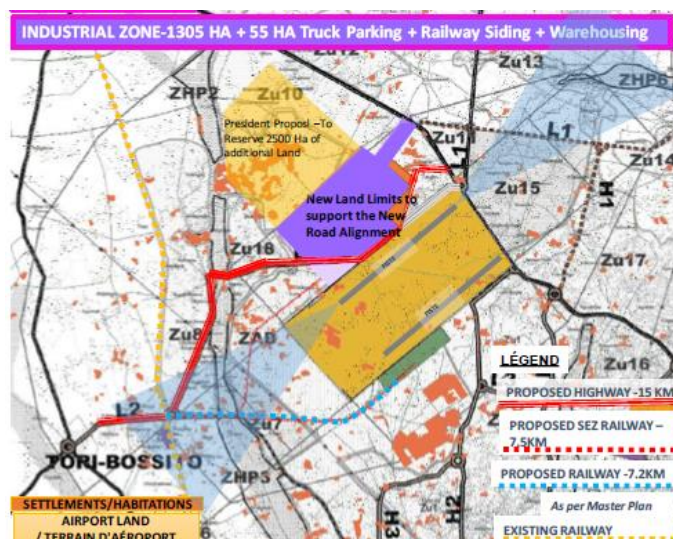


Figure 37 Option 5 - preferred option

A comparison of strengths and constraints of this area has been done in the table below.

Table 26 : Strengths and constraints analysis for option 5

Criteria	Strengths	Constraints
Environmental	<ul style="list-style-type: none"> <li>- Easy access to the site by RNIE2</li> <li>- Absence of village nuclei</li> <li>- Absence of wetlands</li> </ul>	<ul style="list-style-type: none"> <li>- Changing the landscape configuration</li> <li>- Loss of agricultural crops</li> <li>- Loss of wildlife habitat</li> <li>- Proposed Highway splits the land into 2 parts</li> </ul>
Socio-economic	<ul style="list-style-type: none"> <li>- Creation of various jobs</li> <li>- Industrial development of the area</li> <li>- Income for owners of acquired land</li> <li>- Development of small businesses for women</li> <li>- National availability of new products</li> </ul>	<ul style="list-style-type: none"> <li>- Expropriation of land</li> <li>- Relocation of a few isolated buildings</li> <li>- Loss of property</li> <li>- Loss of agricultural crops</li> <li>- Land conflict management risk</li> <li>- Impact on traffic</li> </ul>



## 5.2. Justification of the choice of the preferred alternative

In view of the results of the comparative analysis of the alternative, it appears that the most advantageous variant for the implementation of the present Project is option 5, *i.e.* the Project site located to the north-east of the airport in the districts of Tori-Cada in Tori-Bossito and Tangbo-Djevie in Ze). From an environmental and socio-economic point of view, this option respects the objectives set for the choice of the best site, which are as follows:

- no major displacement of village nuclei;
- no encroachment on the Lama depression (wetland);
- site guaranteeing direct access to RNIE 2.

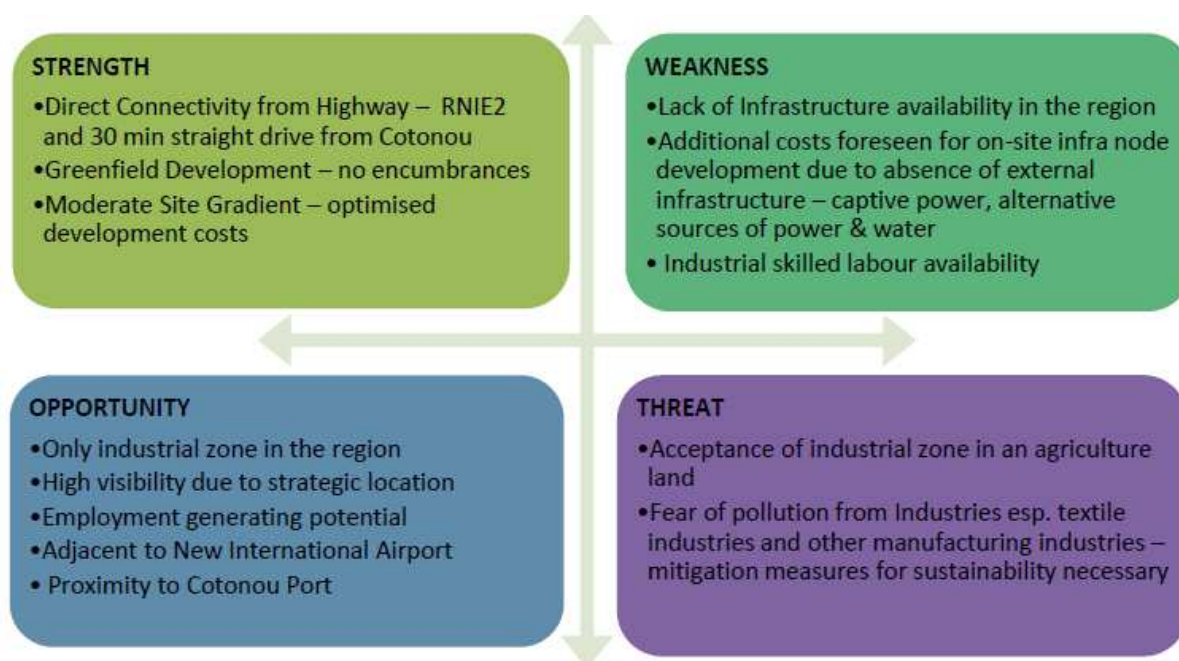


Figure 38 SWOT analysis for the Project

## 5.3. Design modifications

During the preparation of the ESIA for national regulation and for IFC standards, the consultant conducted an iterative process through several exchanges with the client in order to provide advices for design change and adaptation so that the Project can avoid or minimise environmental and social impacts.

The main changes that have been initiated following this process are:

- Due to the impossibility to revise the Project footprint, integration of the sacred forest in the Project footprint and commitment to protect this forest, fence it and maintain a direct access to the forest for villagers that are using it (Anavie but also Agbodjedo, Houeze et Djitin- Aga.
- Displacement of the composting trench and transfer station location that were initially located close to the sacred forest.
- The varieties of trees to be planted in the green areas have been adapted to use trees with higher carbon storage capacities such as *Khaya grandifoliola* or that are more suitable to the ecology of the local area.

## 6. Environmental and social baseline

### 6.1. Data collection methodology

The data collection methodology to establish the initial state of the environment was based on a literature review followed by field investigations.

#### 6.1.1. Literature review

The first step in the information search was the analysis of all data and reports pertaining to the natural and human environment of the Project study area.

The data analysed included the scientific manuals, reports, ground plans, aerial photographs and newspaper articles both national and international. The purpose of this analysis was to build an environmental database for this ESIA and to obtain a preliminary identification of the environmental and social issues of the Project, as well as to point missing data.

The documentary review of the natural environment focused on the study of national and international regulatory texts defining the list of protected species of fauna and flora, studies carried out by national institutions, particularly on air quality issues, as well as various publicly available scientific reports on soil and subterranean compartments and natural habitats, including protected ones. Finally, photointerpretation on satellite images has also made it possible to characterize land use and major habitats in order to establish the action plan for the points to be investigated in the field.

On the social theme, documents relating to demography, housing, education, health, transport infrastructures, socio-community and socio-economic infrastructures in the municipalities of Ze and Tori-Bossito have been researched.

Thus, the documents used are statistical yearbooks, regulatory texts, procedures and manuals or study reports collected from public bodies (central ministries, decentralized services of ministries, municipalities, the National Institute of Statistics and Economic Analysis (INSAE) and other specialized parapublic institutes). Various study reports provided by international or national organizations or researched on the web have completed this documentation.

The monographs of Ze and Tori-Bossito (2006) and the Municipal Development Plans (PDC) of Ze and Tori-Bossito were also valuable sources of information on the state of the physical, biological and human environment of the study area.

**Table 27 : Information collected**

Types of data	Information collected
<i>Biophysical data</i>	Biophysical data Administrative organisations of the localities concerned
	Forms of land use
	Fauna and Flora
	Ecologically sensitive sites (wetlands, forest reserves)
	Topographic
	Geological
	Soil types
	Climatological
	Air Quality
	Surface and ground water
<i>Socio-economic/cultural data</i>	Demographics
	Public and community infrastructure
	Land tenure
	Land uses
	Cultural and religious sites
	Employment/ industrialization
	Income Generating Activities
	Public health (including HIV/AIDS)
	Tourism Resources

(Source: Antea, 2020)

Once the bibliographical review had been carried out, this initial information base was supplemented by that collected during the field investigations.

This documentary research also made it possible to list and analyse the legislative and regulatory texts applicable to the Project as well as the institutional aspects of the Project.

### 6.1.2. Investigations on biological environment

Investigations of the physical environment have been carried out by Antea's team of consultants through a reconnaissance visit to the Project site. This visit enabled the different team members to get to know the area and to make a direct observation of the elements of the environment likely to be affected in the framework of the Project implementation. The elements observed were essentially topography (relief, slopes), soil and hydrography (surface and groundwater).

The investigations of the biological environment focused on the fauna and flora. The methodological approach adopted is presented below.

#### 6.1.2.1. Field visit

Field investigations have been performed during the dry season and a first inventory of fauna and flora was provided. A second field investigation has been conducted in the rainy season in order to:

- Identify the flora and fauna species present in the area during the rainy season (May to mid-July) and to complete the inventory carried out in the dry season (November 2019).
- Carry out a census of flora species in the sacred forest of Anavie.
- Complete census data for mammalian fauna using trapping and video capture techniques.
- Carry out a census of the avifauna species by an ornithologist.

The investigations schedule was the following.

**Table 20 Fauna and flora investigations schedule**

Type of investigations	Date (DD/M/YYYY)	Comments
Flora and fauna (dry season)	17/07/2020	7.30 am at 4 pm
	18/07/2020	7.12 am' at 4.05 pm
	19/07/2020	7.22 am' at 4.10 pm'
	20/07/2020	7.31 am' at 4.15 pm
	21/07/2020	7.03 am at 4.22 pm
	22/07/2020	7.05 am at 3.11 pm
Flora (rainy season)	17/07/2020	7.30 am at 4 pm
	18/07/2020	7.12 am at 4.05 pm
	19/07/2020	7.22 am' at 4.10 pm'
	20/07/2020	7.31 am' at 4.15 pm
	21/07/2020	7.03 am at 4.22 pm
	22/07/2020	7.05 am at 3.11 pm
Avifauna (rainy season)	23/07/2020	7.13 am' at 11.43 am
	24/07/2020	3.12 pm' at 5.42 pm
	25/07/2020	7.30 am at 11.45 am
	26/07/2020	7.22 am at 10.44 am
	27/07/2020	3.14 pm' at 6.10 pm
	28/07/2020	7.13 am' at 10.39 am
	29/07/2020	7.19 am at 10.20 am
	30/07/2020	3 pm at 6.28 pm
	30/07/2020	9.21 pm' at 11.24 pm
	31/07/2020	11.20 pm' at 4.11 am
Mammal (installation and removal of trap cameras) (rainy season)	24/07/2020 at 03/08/2020	24/24h
Mammal (installation and removal of trap cameras) (rainy season)	24/07/2020 at 13/08/2020	24/24h

These field investigations allowed understanding the occupation of the land and its vegetation (trees, shrubs and herbaceous plants) as well as the species of fauna (mammals, avifauna, insects, reptiles, amphibians) and traces of fauna (footprints, droppings, relics) in the environment. During these visits, information was gathered from secondary sources (exchanges with the villagers encountered on the species of fauna they encounter around their fields and houses). Fauna and flora field sheets were drawn up for this purpose (see Annex IV). The complete fauna and flora report is available in Annex V.

#### 6.1.2.2. Flora data collection

The simple random sampling technique was used for plot installation. With this technique, the plots have been installed independently of each other and thus respect the randomness of the observations required for statistical analysis (Glele Kakaï *et al.*, 2016).

Surveys have been carried out in the areas where natural vegetation was still present. As much as possible, plots visited for the dry season have been reinvestigated in the rainy season to compare data between the 2 seasons.

The following table and figure show the locations of the plots on the site for the vegetation surveys.

**Table 21 Plot coordinates (UTM) and associated area**

N.	Points	Locality	Latitude	Longitude	Surface (m <sup>2</sup> )
1	R1	TORI	415843,065	725692,128	900

N.	Points	Locality	Latitude	Longitude	Surface (m <sup>2</sup> )
2	R2	TORI	414156,26	726389,553	900
3	R3	TORI	415656,555	725671,222	900
4	R4	ZE	416824,064	727137,985	900
5	R7	ZE	416465,847	728958,065	900
6	N1	TORI	415650,557	725483,473	900
7	N2	TORI	414387,674	727327,436	900
8	N3	ZE	418076	729229	900
9	N4	ZE	418093	729292	900
10	N5	ZE	418179	729274	900
11	D1	ZE	415429,727	728204,74	900
12	D2	ZE	416077,492	728994,953	900
13	D3	ZE	417694,832	728465,173	900

R1 ...R7 : Sampled points in both season

N1, ...N5 : New sampled points in rainy season

D1, ... , D3: sampled points only during dry season

Phytosociological data were collected by stratum: tree, shrub (1-8 m), herbaceous. The surveys were conducted:

- At the end of the rainy season and thus the beginning of the great dry season (late November - early December 2019); this is a period of flowering and fruiting of species, particularly herbaceous plants, thus facilitating species distinction in the field. 8 plots were sampled.
- During the rainy season (July-August 2020). Same plots as for the dry season were reused but because 3 plots initially inventoried (D1, D2, D3) have been converted into agricultural land (maize and pineapple crops), 3 new plots in natural vegetation were defined in other places. Moreover, the 3 additional plots were located in the Anavie sacred forest, initially excluded of the Project area. At the level of the sacred forest, a temporary water point (forming during the rainy season) was found. A plot was therefore installed to assess the species present along this temporary water pond.

In total, 10 plots were installed across the various plant formations, including 3 in the sacred forest.

During the phytosociological surveys, herbaria of all the species encountered were established. Those whose identification was in doubt were sent to the Benin National Herbarium for precise identification. For each survey, soil texture and type of plant formation were recorded. Soil texture is determined by the manual survey method. Phytogeographic types of species are based on the chorological subdivisions of F. White (1983, p. 38).



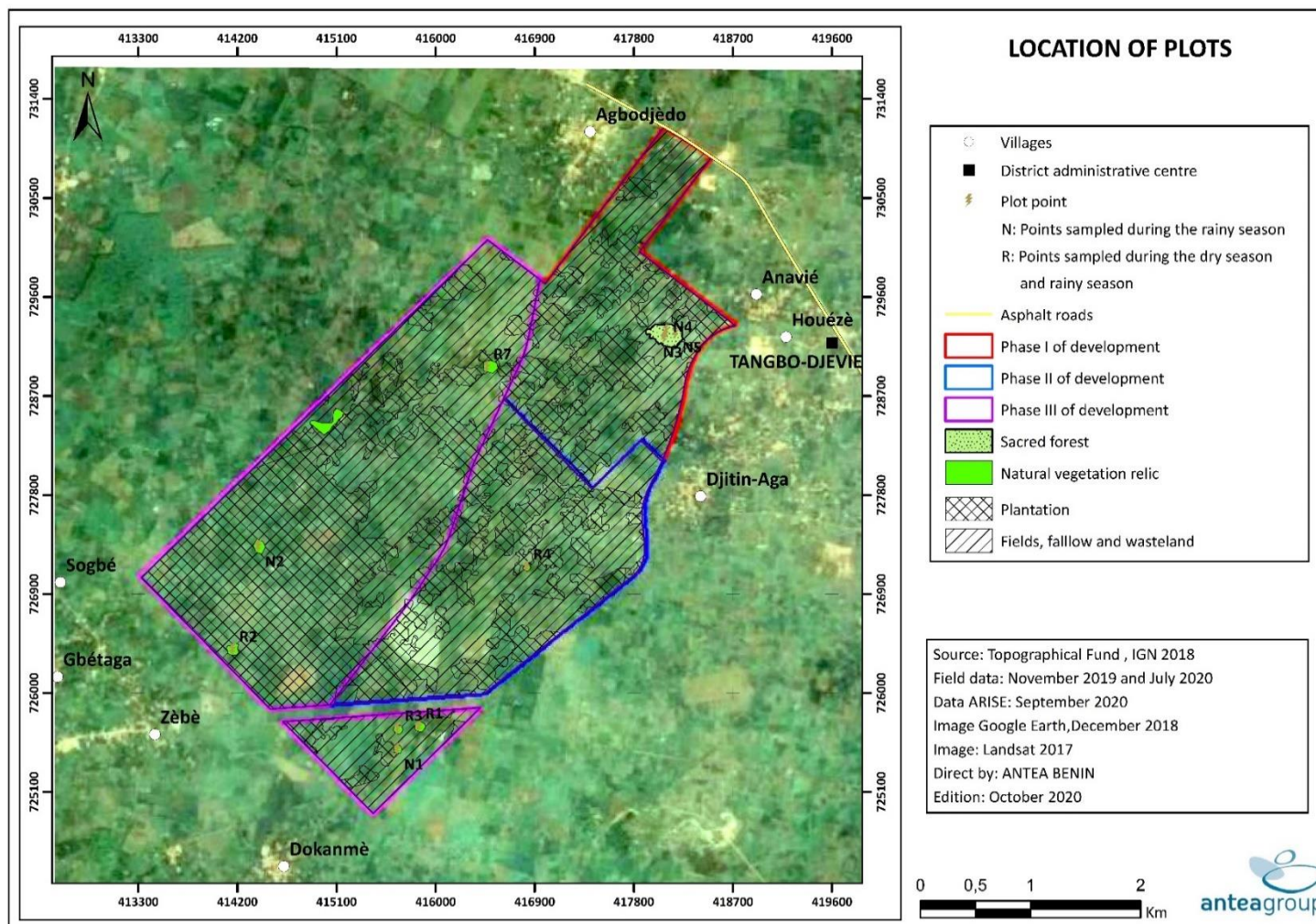


Figure 39 Plots location on site for vegetation surveys



### 6.1.2.3. Fauna data collection

#### 6.1.2.3.1. Avifauna

The method used for the inventory of diurnal birds is inspired by the Kilometric Abundance Index (IKA) which uses line transects, developed by Ferry and Frochot (1958). The one adopted for night outings is the Punctual Index of Abundance (I.P.A.) which uses listening points proposed by Ferry and Frochot (1958).

Identification of the most photographed species was carried out based on the identification guide (BORROW N. and DEMEY R., guide for West Africa birds, 2015). The CREDI-ONG bird photo database was also used.

The proposed transects and tapping points are illustrated in the figure below:

- Diurnal survey (transects)

Eight transects of 2 to 3 km-long have been covered at a speed of 1 km / h, stopping every 20 meters. Of this 8 transects, 5 were travelled in the morning and 3 in the afternoon to maximize the species contact. All the species observed and heard along the transects were inventoried. The inventory was made on both sides of the axis of progression. Field observations began at sunrise at 7:00 a.m. and in the afternoon from 3:00 p.m. These times were chosen with reference to the study conducted by AHON et al. (2012) which states that fieldwork is generally carried out from 6:30 a.m. to 11:00 a.m. and from 3:00 p.m. to 6:00 p.m.

- Nocturnal survey (listening points)

In order to determine the existence of possible nocturnal raptors, 2 nocturnal surveys were carried out. They were carried out in 2 sequences: 8 p.m. to 11 p.m. and 12 a.m. to 5 a.m. The listening points were placed around the large sacred forest island of the site because of the presence of large trees that can host the raptors. All the species heard were recorded at each point for a period of 20 minutes. For this purpose, a sound recorder (dictaphone) was used to record the songs and / or calls of unknown birds which were later identified at the office thanks to the CD-ROMs of Claude CHAPPUIS (Chappuis, 2000).

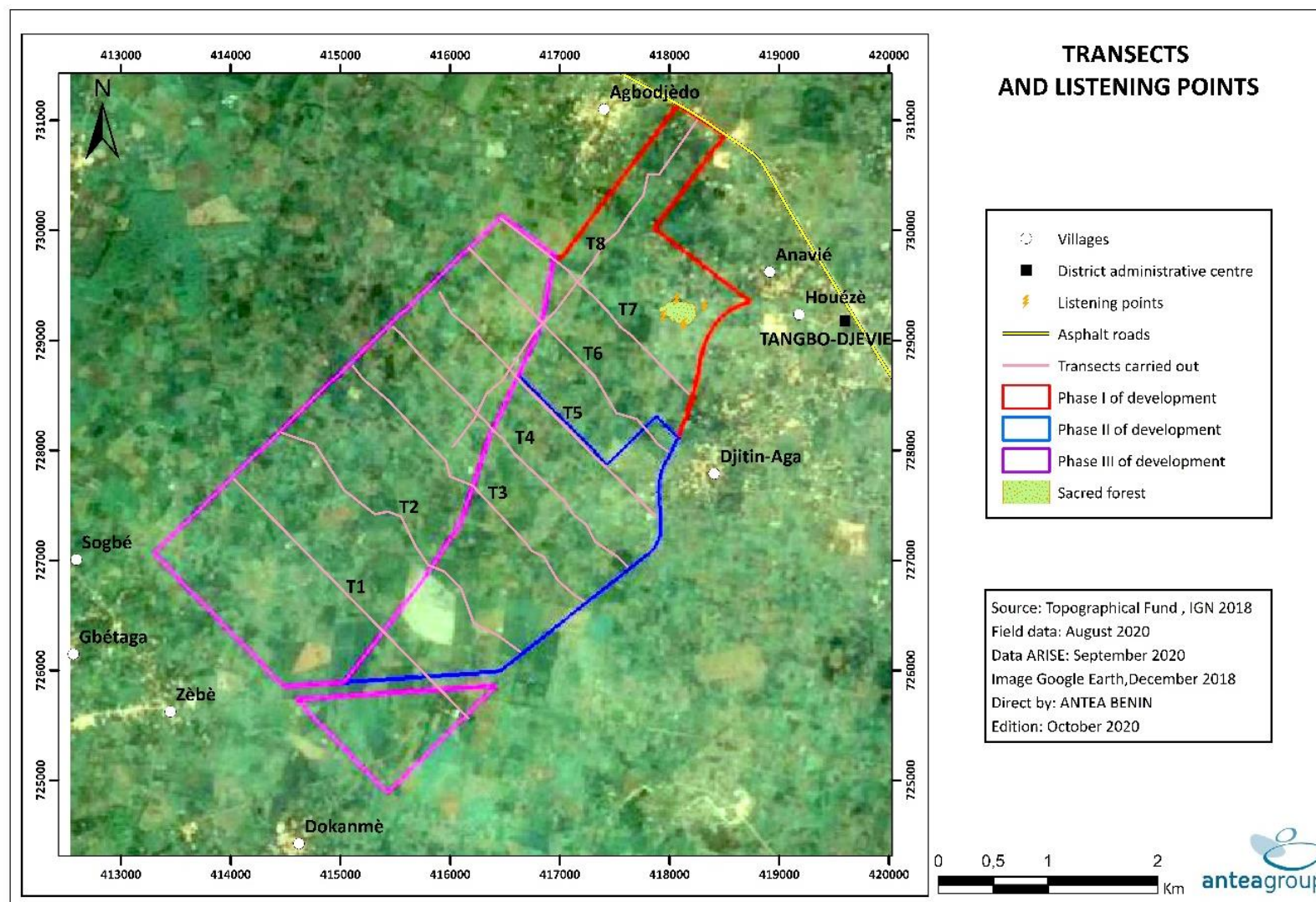


Figure 40 Transects and listening points for avifauna

#### 6.1.2.3.2. Other fauna

Data collection on fauna, except avifauna, was conducted based on 4 sources of information:

- Collection of data on the presence of fauna species and traces of fauna (footprints, droppings, relics, food scraps) found during the **transects walks** or in **flora** plots.
- Collection of data from **discussion with local hunters**.
- Collection of data from 10 **cameras** positioned 50 cm above the ground. In functioning 24h-day for 10 days, with one check after 5 days.
- Collection of data from 10 **non-injurious traps** checked every morning for 20 days (after 10 days all traps were repositioned at another location).

The selection of the location points of cameras and traps was based on signs of presence (droppings, footprints, dormitory, food leftover, presence of food) and the field guides knowledge (hunters). A total of 13 points were identified in 3 different habitats (fallow land / crops, acacia plantation and forest relic). Ten cameras were installed, including 5 cameras in the forest, 3 in the plantations and 2 in the crops / fallow). Coordinates of each camera and / or trap were taken using a GPS (see following table). The camera/trap locations are shown in the figure below.

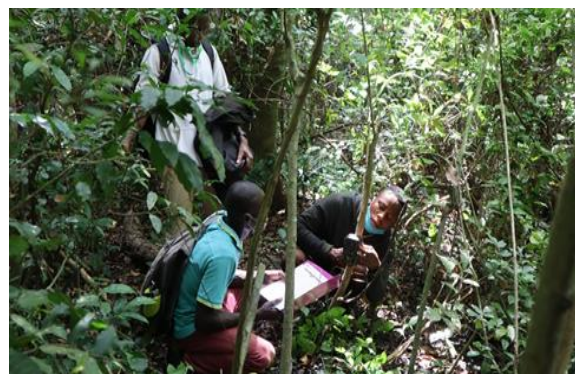
**Table 22 Camera points coordinates (UTM)**

Camera identification	Latitude	Longitude	Habitats
B002	6,609636	2,256281	Wasteland
LEA2B10	6,588892	2,254191	Acacia plantation
LEA2B14	6,563891	2,231929	Fallow land
AC1	6,577083	2,23482	Maize crops
LEA2S4	6,577224	2,234885	Fallow land
AC2	6,596189	2,259149	Sacred forest
B001	6,59616	2,25915	Sacred forest
C4	6,597366	2,258111	Sacred forest
AC3	6,597191	2,259953	Sacred forest
A8	6,596519	2,259842	Sacred forest
AC1	6,597211	2,259589	Sacred forest
LEA2S4	6,59611	2,259456	Sacred forest
LEA2B14	6,597211	2,259027	Sacred forest

**Table 23 Traps points coordinates (UTM)**

Trap identification	Latitude	Longitude	Habitats
P1	6,579583	2,231228	Plantation
P2	6,576793	2,218405	Crops
P3	6,573555	2,22252	Plantation
P4	6,575162	2,221872	Crops
P5	6,594258	2,256652	Crops
P6	6,593662	2,256503	Crops
P7	6,59321	2,255927	Crops
P8	6,591852	2,239392	Crops
P9	6,585352	2,232852	Crops
P10	6,584473	2,237587	Crops
P1	6,571962	2,243708	Crops

Trap identification	Latitude	Longitude	Habitats
P2	6,565655	2,241363	Plantation
P3	6,572562	2,249643	Crops
P4	6,577203	2,253242	Plantation
P5	6,586643	2,242722	Plantation
P6	6,579992	2,239028	Plantation
P7	6,591265	2,2443	Plantation
P8	6,60397	2,25178	Crops
P9	6,573223	2,246617	Crops
P10	6,574608	2,227755	Plantation



(Source: Antea, juillet 2020)

**Figure 41 Installation of camera in *Acacia auriculiformis* plantation (left) and sacred forest (right)**

Given the degree of anthropization of the site, a trap/camera supervision was necessary to carry out the work. A total of 10 hunters were identified in 8 villages affected by the Project to complete this task successfully.

The recruitment of hunters made it possible to involve local population in the Project, avoid conflicts between the field team and residents and limit tools vandalism and damage.

The identification of species was based on the West African mammal identification guide and the CREDI-ONG mammal photo base. All species photos taken by the cameras have been identified.



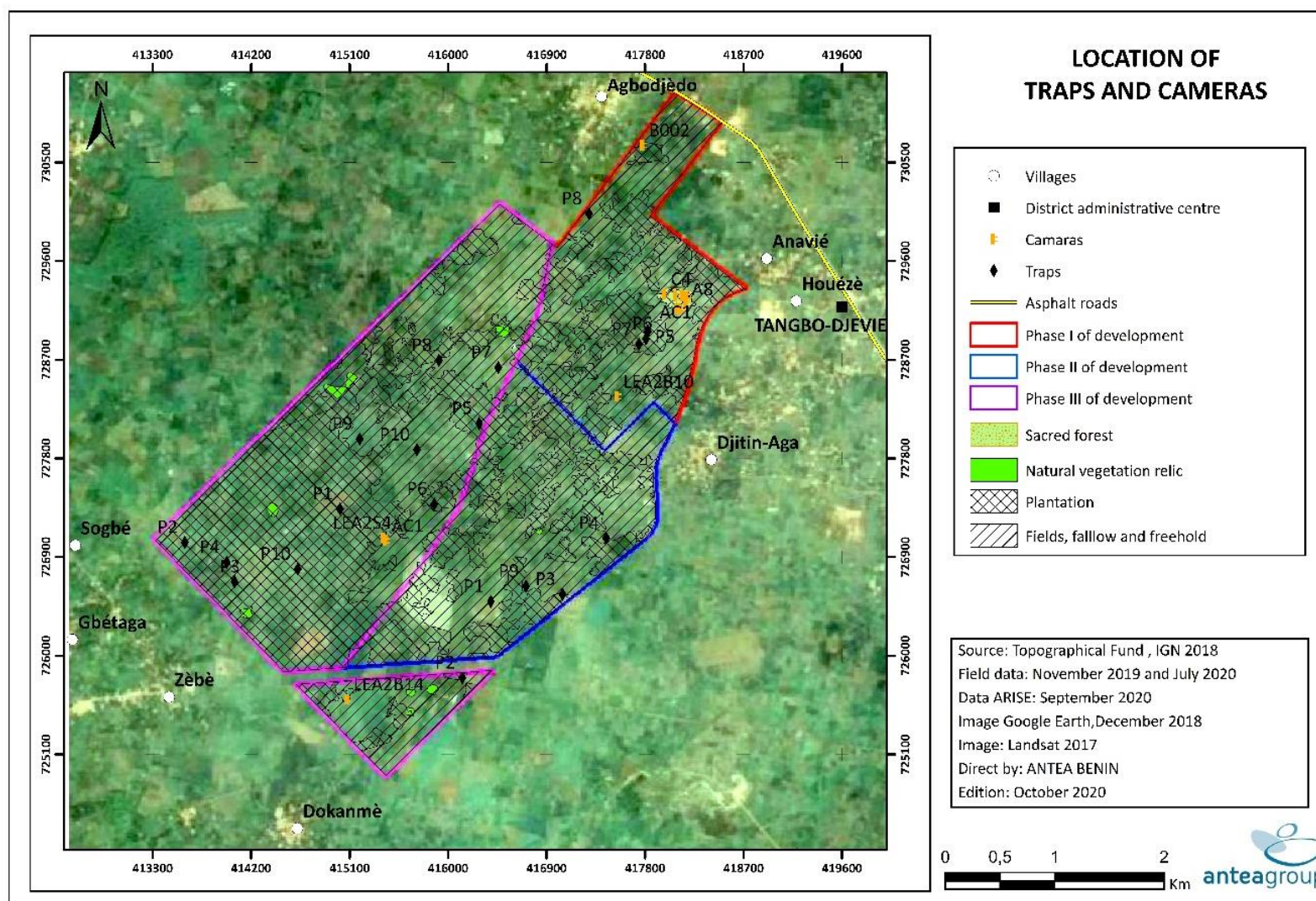


Figure 42 Non-injurious traps and camera locations

### 6.1.3. Investigations of the physical environment

#### 6.1.3.1. Scheduled and location

Additional investigations were scheduled in September to characterize the environmental quality with a focus on air, noise, groundwater and soil components. Surface water, as they are inexistent on Project site, were not investigated.

Location of these sampling points is illustrated in the figure below and coordinates are provided in the following tables.

**Table 24 Coordinates of soil, groundwater, air and noise sampling stations**

Soil stations		
Name	X (m)	Y (m)
GW_01	6.568163	2.242312
GW_02	6.582752	2.255506
GW_03	6.604881	2.255007
GW_04	6.594084	2.239802
GW_05	6.582025	2.217347
GW_06	6.56824	2.221672

Groundwater stations		
Name	X (m)	Y (m)
Soil_01	6.607951	2.258073
Soil_02	6.597809	2.25887
Soil_03	6.59477	2.249462
Soil_04	6.587626	2.234761
Soil_05	6.587626	2.234761
Soil_06	6.57314	2.244142
Soil_07	6.56237	2.235677
Soil_08	6.569434	2.230454

Air stations		
Name	X (m)	Y (m)
Air_01	6.605017	2.254982
Air_02	6.56872	2.223121

Noise stations		
Name	X (m)	Y (m)
Br_01	6.605787	2.251196
Br_02	6.600654	2.259869
Br_03	6.583156	2.257806
Br_04	6.568231	2.22182
Br_05	6.586422	2.243038



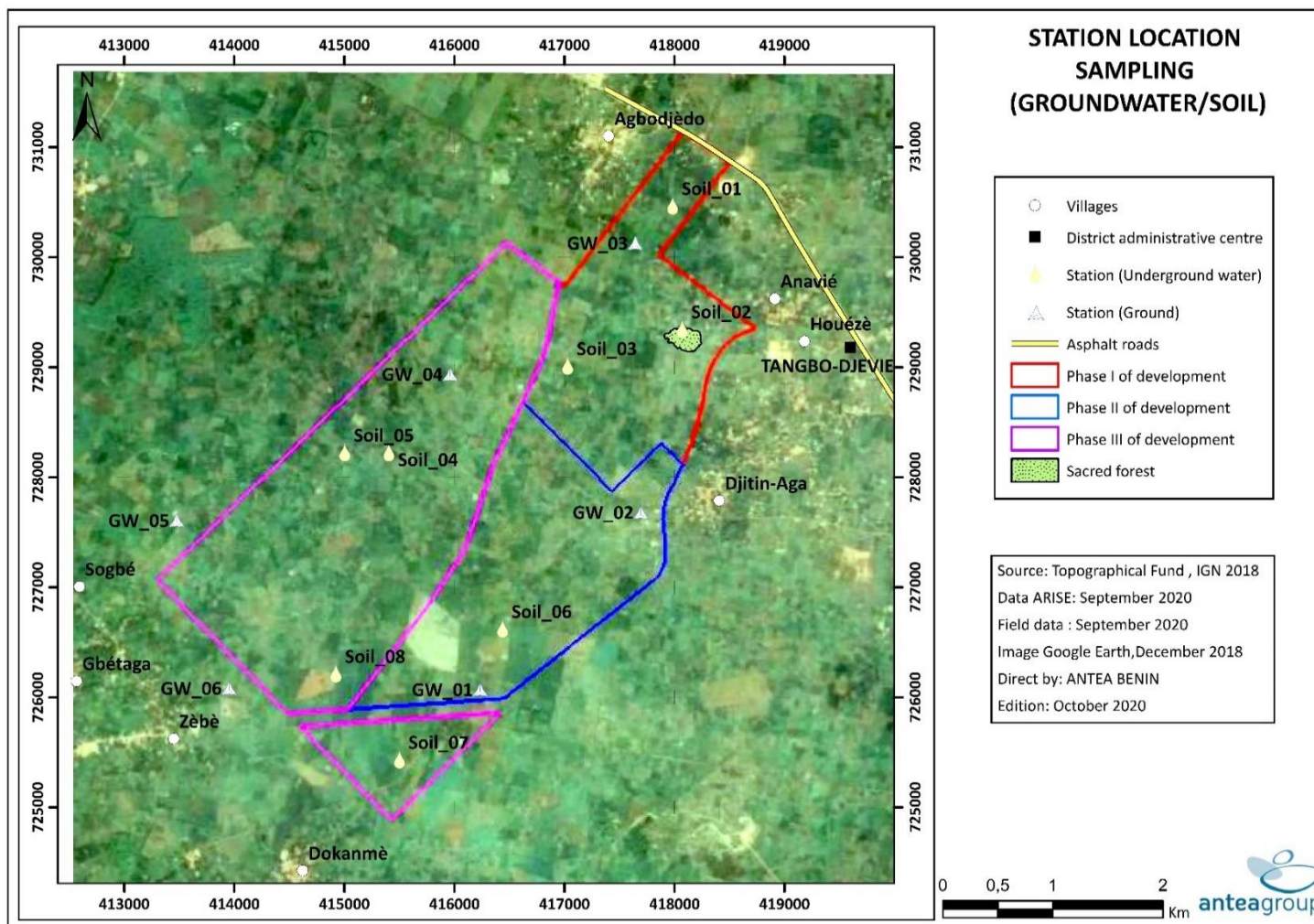


Figure 43 Location of groundwater and soil sampling points

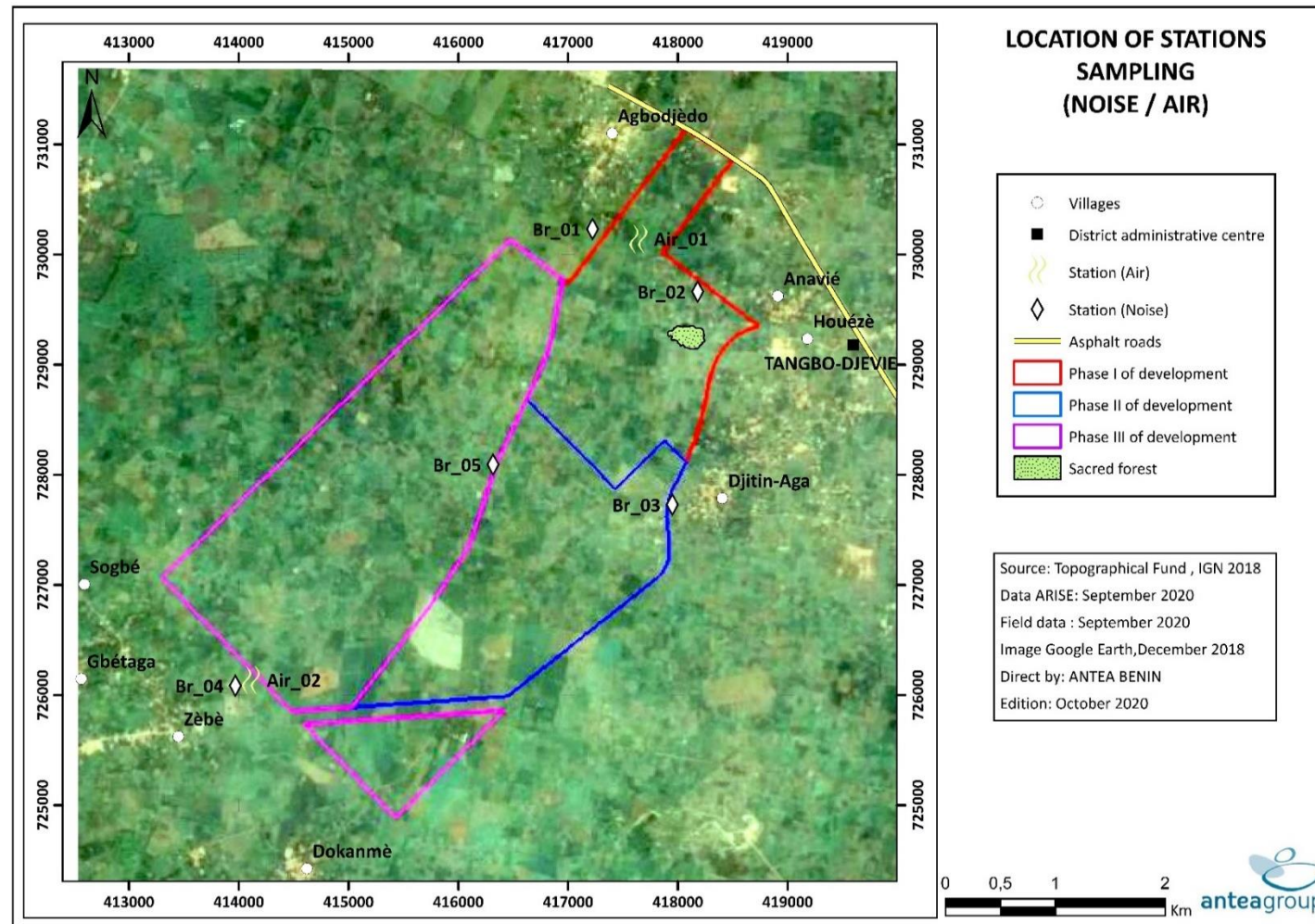


Figure 44 Location of air and noise sampling points



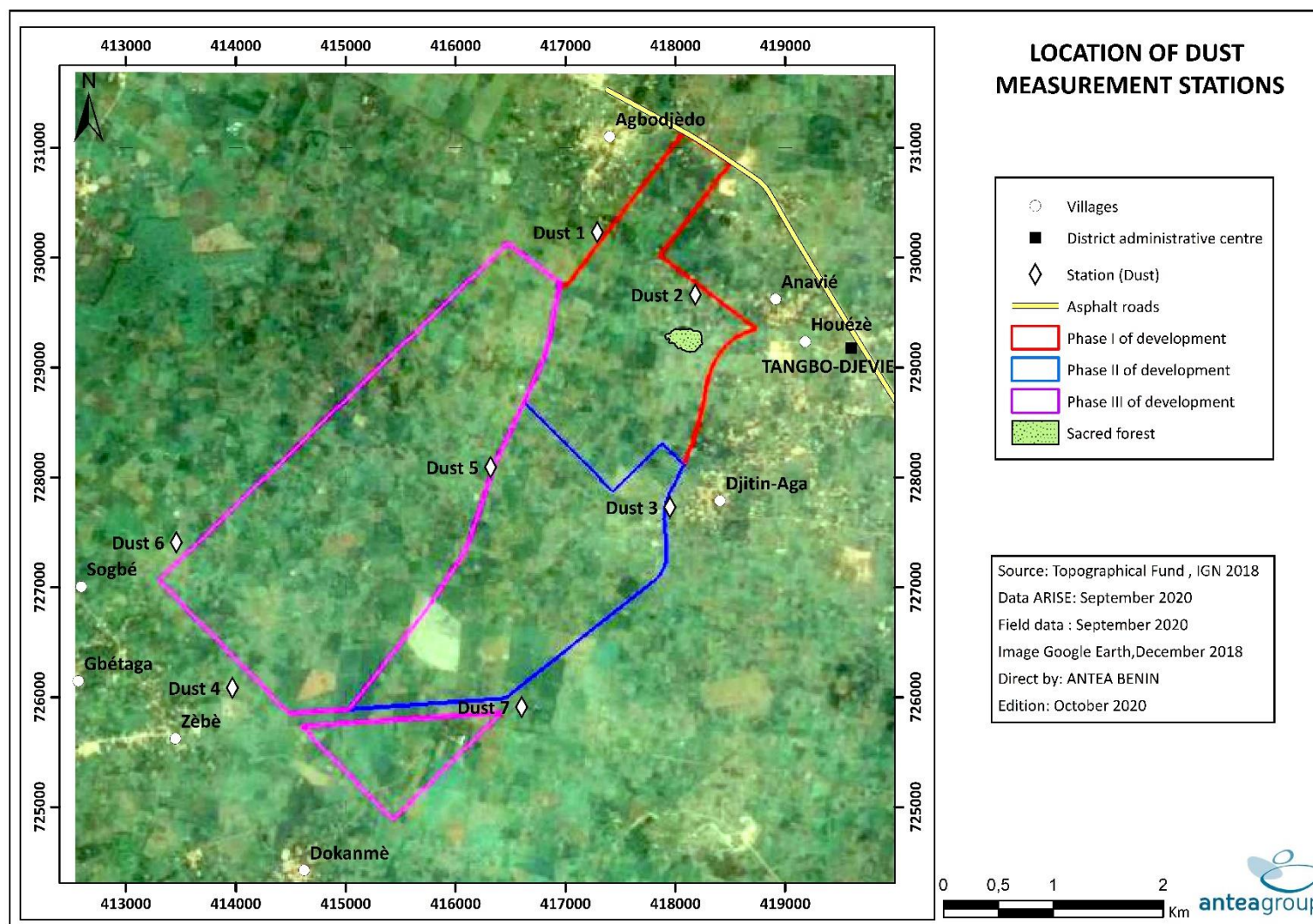


Figure 45 Dust measurement stations

Location of stations have been selected based on the following criterium:

- Air and noise: sensitive area closest to the Project, which will also be so during the Project in operation. These sensitive areas are:
  - habitat areas present today near the Project, and which will always be there once the Project is in operation,
  - at the level of the villages crossed by the machines (rolling track).

The stations were also distributed according to the direction of the wind (upwind or downwind as well as in a "neutral" position).

- Groundwater: as far as possible, the sampling points were chosen to be upstream and downstream of the site, giving priority to existing wells since no drilling was planned.
- Soil: stations have been positioned so as to obtain representativeness of the area, and specially the various habitats.

A field sheet has been filled for each station and provides details on the period when the sampling was performed, on the environmental location, in-situ results (when applicable) and photos of the station. All these sheets are available in Annex VII.

The investigation schedule was as follow:

- Air sampling: in situ dust measurements conducted on October 28<sup>th</sup> and 29<sup>th</sup>. Radiellos (passive tubes) were onsite for seven days, from the October 19<sup>th</sup> to the 25<sup>th</sup>;
- Noise measurements: in situ measurements October 28<sup>th</sup> and 29<sup>th</sup>.
- Soil samplings: October 21<sup>st</sup>;
- Groundwater samplings: October 23<sup>rd</sup>.

During all this week, the weather was generally good for investigation, no rain or strong wind was recorded.

### 6.1.3.2. Methodology for investigations

#### 6.1.3.2.1. Air

Air measurements have been conducted with passive tubes, Radiello. Radiello® passive diffusers consist in two elements, a diffusive body in which an adsorbent cartridge is inserted.

The principle of measurement by passive diffusion is based on the diffusion of a gaseous compound (through a porous membrane - diffusive body) to a specific trapping surface for the pollutants sought (absorbent cartridge grafted with 2.4-DNPH19 for the aldehydes, triethanolamine for NO<sub>2</sub>, activated carbon adsorbent cartridge type Carbograph 4 for VOCs).

The amount of molecules trapped will be proportional to its concentration in the air. The cartridges are then analyzed in the laboratory. The average concentrations over the exposure period are determined according to the sampling conditions (in particular the temperature).

Sampling was performed with passive tubes which were left at the measuring station for 7 days. The pollutants measured were VOC, H<sub>2</sub>S, NO<sub>2</sub>, SO<sub>2</sub>, O<sub>3</sub>. There were therefore 5 tubes per station.

The tubes were:

- placed at a height, 2 meters from the ground;
- placed away from all materials, heat sources or air stream;

- protected from the rain.



**Figure 46 Radiello passive tubes**

Dust (PM<sub>2.5</sub>, PM<sub>10</sub> and PM total) were also measured in situ with a dedicated equipment (Microdust). Seven locations were surveyed: 5 corresponding to the noise sampling locations and 2 additional locations.

#### **6.1.3.2.2. Noise**

Noise measurements were performed with an analog sound level meter over a period of 30 minutes to 54 minutes. Specific attention regarding the position of the sound level meter was carried out on:

- any obstacles were at least 1 meter from the sound level meter and the microphone headed in the opposite direction;
- the measurement was made at approximately 1.50 m from the ground;
- the sound level meter has been placed away from sources of parasitic noise.

The sound level meter was used with the anti-wind ball and out of rainy and strong wind conditions. Because of safety issues, no measurement was performed on the nighttime.

#### **6.1.3.2.3. Groundwater**

Groundwater was sampled in existing wells (traditional or with a pump). Samples were taken according to the type of well:

- Well with pump: after letting the water flow to renew the water in the well, the jars were placed under the flow, taking care that they do not come into contact with the well to avoid contamination.
- Traditional well: once the temporary container rinsed with water from the well, it was refilled to complete the jars.

A temporary container was filled at each station to perform in situ measurements (temperature, pH and conductivity). Between each station, all equipments have been rinsed with water from the well.

#### **6.1.3.2.4. Soil**

The soil samples were taken so that the collected samples best represent the soil to be studied. The soil samples taken here are not intended to characterize a precise lithology, even if they can give an indication, but rather to determine the qualitative state of it. Samplings were therefore superficial and carried out manually (shovel or manual auger). Samplings were carried out dry, without fluid.

The following steps have been implemented:

- make sure that the auger / shovel does not contain soil residue from another sector;
- dig with a shovel about 10 centimeters deep, removing surface soil;

- take the materials from the ground and put them in the appropriate bottles. The jars were filled to the maximum to avoid volatilization of compounds.

#### 6.1.4. Investigations on the human environment

The purposes of a social baseline study are to:

- provide key socio-economic knowledge on the territories impacted by the Project;
- provide targeted qualitative and quantitative data with an adapted analysis;
- constitute the social part of the ESIA;
- constitute a reference situation for the socio-economic monitoring of the Project's impacts;
- list and map the community and cultural infrastructures (visible cultural and archaeological heritage sites located on the Project site) impacted by the Project.

In order to produce this baseline, data collection activities were carried out in the municipalities of Ze and Tori-Bossito, specifically in the 8 villages that make up the study area.

Depending on the specificities of the information sought, the study was qualitative and quantitative in nature, and was considered in a complementary manner. The following techniques were used:

- field visits to the site and the 8 villages of the study area;
- semi-directive interviews with village authorities (village chiefs, councils, religious leaders) of the villages in the study area;
- focus groups with women, youth, farmers, traders, civil society organizations.

The table below presents more details about the social data collection techniques.

**Table 28 : Socio-economic data collection methods**

Study area considered	Methods/Tools / Source of usable data
Project study zone	<ul style="list-style-type: none"> <li>• Existing documents in libraries and in particular at the University of Abomey-Calavi and Parakou (dissertations, theses, study reports, internet, etc.)</li> <li>• Cartography/GIS resulting from data collection</li> </ul>
	<ul style="list-style-type: none"> <li>• First field survey by our teams (social expert) on the entire study area between October and December 2019</li> <li>• Complementary field survey in August to September 2020</li> <li>• Interviews with 8 head of villages and their councils/elders</li> <li>• Focus Groups with women, youth, farmers, traders, civil society organizations</li> <li>• Visits to Tori-Cada and Tangbo-Djevie district health centres</li> <li>• Interviews with Social promotion centres on vulnerable groups</li> <li>• Interview with Anavie leaders on the subject of Anavie sacred forest</li> <li>• GPS survey of main public infrastructures in 8 villages</li> <li>• Public Consultations in 2 municipalities</li> </ul>



## 6.2. Geographical location of the Project and delimitation of the area of influence

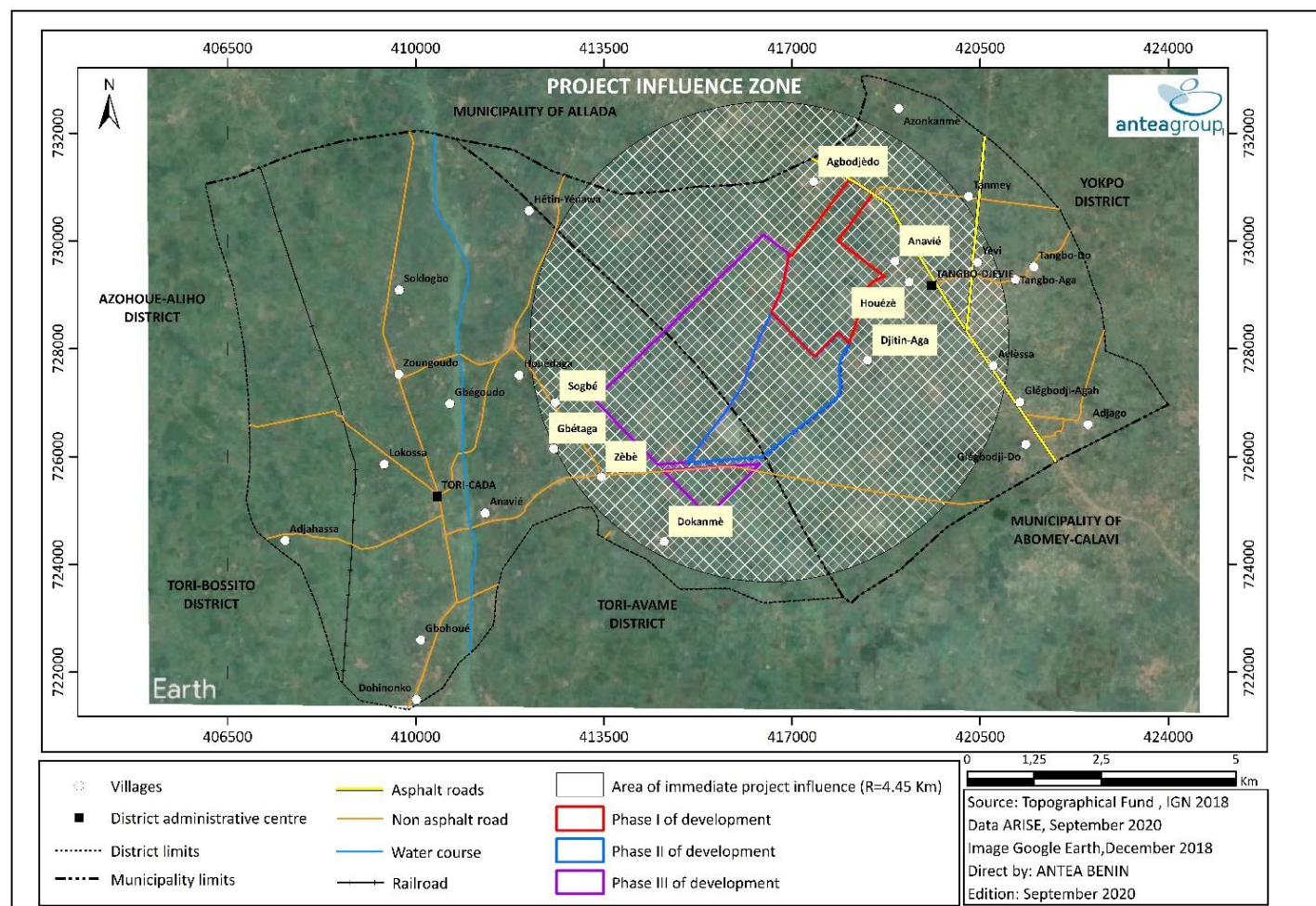
Before starting an environmental and social impact assessment, the area to be studied should be determined. This area generally corresponds to the Project's direct zone of influence, i.e., where the majority of environmental and social impacts will materialize, mainly resulting from the Project's physical rights-of-way; and to a lesser extent the Project's indirect zone of influence, where indirect impacts resulting from a cause-and-effect relationship such as Project-induced in-migrations, will materialize.

The study area identified for the Project therefore covers the municipalities of Ze and Tori-Bossito in the Atlantic Department and encompass the 8 villages closest to the site namely:

- Agbodjedo, Anavie, Djitin Aga and Houeze in the municipality of Ze;
- Gbetaga, Sogbe, Zebe and Dokanme in that of Tori-Bossito.

These villages have been included in the study area because they are located between 200 and 800 meters from the Project boundaries and they will be directly and indirectly affected by the Project's impacts.

The following figure shows a schematic presentation of the Project's influence zone.



## 6.3. Physical Environment

### 6.3.1. Climate

The Atlantic Department is essentially marked by a sub-equatorial climate. This climate is characterized by 4 seasons, 2 of which are dry and 2 rainy:

- the 2 dry seasons (large and small) are observed from early December to March and from August to mid-September;
- as for the rainy seasons, the large one covers the period from March to the end of July and the small one extends from mid-September to early December.

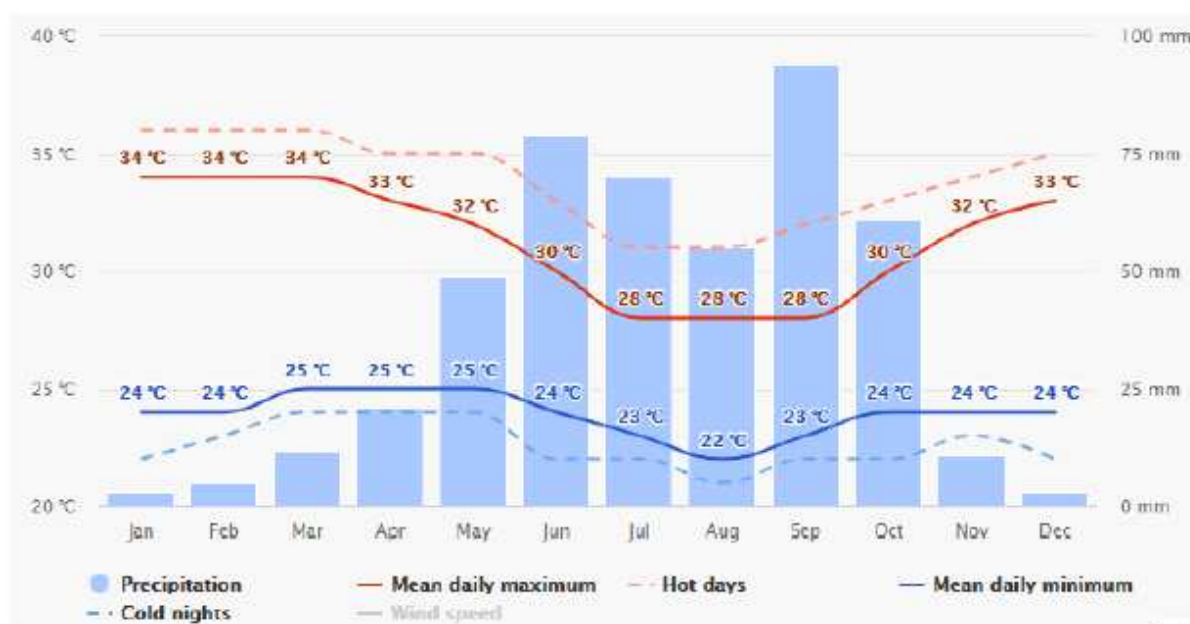
At the local scale, the climatic characteristics are similar with a few variations. Indeed, the localities in the study area are marked by 4 seasons, which are distributed as follows:

- a great rainy season (April to July);
- a small rainy season (September to November);
- a great dry season (December to March);
- a small dry season (July to August).

#### 6.3.1.1. Temperature

The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Allada town (which is the nearest town 10 km from GDIZ site). Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years.

Average monthly temperatures varied between 22 and 34 degrees Celsius, depending on the season. The difference between the warmest and the coldest month does not exceed 3 to 5 degrees. February to April are the hottest months and July to September are the coolest months.



(Source: meteoblue.com)

Figure 48 Average temperature and precipitation at Allada Town

#### 6.3.1.2. Rainfall

The average annual rainfall is about 500 mm, with 250 mm in the first rainy season and 160 mm in the second rainy season. There is a decrease in rainfall levels from north to south and from east to west.

The Project area is located about 40 km north of Cotonou, where precipitation is about 1,244 mm. As there is some doubt regarding the availability of the climatic information for the Project area, the climatic pattern of Cotonou city and details of Benin has been considered. From the available rainfall/precipitation data, it is assumed that the peak rainfall intensity would be about 20mm/hr.

#### 6.3.1.3. Sunshine

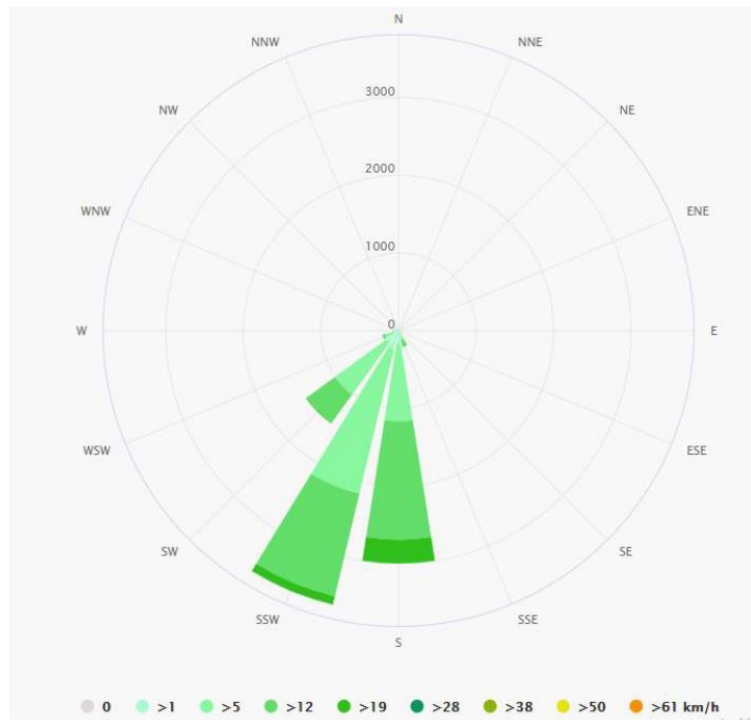
The zoning of the solar irradiation rate shows that Benin can be subdivided into 4 zones. These zones are classified in decreasing order of magnitude in relation to their solar energy potential. The study area is located in the fourth zone called the southern zone which sweeps from East to West the departments of Plateau, Oueme, Zou, Atlantic, Couffo and Mono. In this zone, the annual solar deliverability is of the order of 1800 - 1900 kW/m<sup>2</sup> (PVGIS copyright European Commission 2001-2008).

The study area therefore has an average sunshine of 5.14 KW / m<sup>2</sup>/day.

#### 6.3.1.4. Winds

Wind direction in the Project area is along a south-west / north-east axis. The following wind rose shows the main wind direction from SSW to NNE. Wind speed in the Project area generally varies between 5 km/h and 19 km/h.





(Source: meteoblue.com)

**Figure 49 Wind rose of Allada town**

Winds in the study area are characterized by the occurrence of strong winds in the dry season and at the end of the rainy season (PDC 3 of Ze, 2019). It causes biophysical and socio-economic impacts such as the destruction of houses (especially roofs), crops and sometimes crops. The photo below shows the effect of wind in a maize field. The photo shows that after the passage of a strong wind the maize plants are no longer standing. Others are broken and even uprooted.



(Source: Antea, november 2019)

**Figure 50 : Maize field after the passage of a strong wind at the Project site**

#### 6.3.1.5. Climate change

Since few years, several variations have been already observed, especially:

- The decrease of the average annual rainfall by 180 mm (November to March).
- The recurrence of very heavy and violent rains leading on floodings (August to October).
- The early drying up of wells and aquifers with the reduction of available water.
- The modification of the rivers and streams regimes.
- More frequent drought with the persistence during the dry season leading in critical crops phases (December to February).
- Late rains.
- Etc.

All these changes increasingly disturb the reproduction cycle of animals, flower cycle of vegetation, including crops and plantations, destroy harvests and habitats and lead to conflict for water due to problems with supply, among other reported issues.

### 6.3.2. Air quality and noise

#### 6.3.2.1. Air quality at national level

Air pollution is an insufficiently studied phenomenon in Benin. The current air quality monitoring system is limited to measurements of pollutant concentrations in the ambient air. In recent decades, environmental problems have become increasingly perceptible in Benin's main cities, especially Cotonou. These problems result, among other things, from air pollution in which the transport sector is an important player. Several factors are at the root of this phenomenon:

- rapid population growth;
- commercial and industrial development;
- poor urban road infrastructure;
- the poor condition of the rapidly growing automobile fleet;
- the uncontrolled development of urban transport by two-wheeled vehicles;
- the use of poor-quality petroleum products.

The first study carried out on air quality in Cotonou in 2000 with the support of the World Bank revealed, on the one hand, that transport is the main source of ambient air pollution by exhaust fumes and, on the other hand, that the cost of pollution in the city of Cotonou alone is about 1.2% of the GDP of the whole country.

In order to reverse the trend, Benin adopted a national strategy to combat air pollution in 2000. After about 7 years of struggle, Benin has taken a pause to measure the progress made. To this end, the support of the World Bank's "Clean Air Initiative" program was requested to evaluate the results of this fight between 2006 and 2007. The results reveal that:

- Sulphur dioxide pollution remains very low (less than 10  $\mu\text{g}/\text{m}^3$ ) due to the lack of sustained industrial activity.
- pollution by nitrogen oxides is at fairly high levels, averaging 36.5  $\mu\text{g}/\text{m}^3$  and peaking at 90  $\mu\text{g}/\text{m}^3$  in areas of heavy traffic. The study highlighted the fact that the growth of the car fleet is expected to make this pollution a concern in the coming years.
- Pollution by volatile organic compounds (VOC) and in particular benzene is of great concern. This pollution is largely due to two-stroke motorcycles. Benzene is carcinogenic and according



to the results of scientific studies carried out on this subject, it has been estimated that benzene causes an excess collective risk of about 164 cancers per year in Cotonou. The average benzene pollution in Cotonou has been estimated at  $30 \mu\text{g}/\text{m}^3$ . It was mentioned that this value should be reviewed with new measurements over a longer period of time.

- the dust emitted remains the main pollution of the city. The annual average concentration of PM10 particles has been estimated at  $78 \mu\text{g}/\text{m}^3$ , with daily peaks exceeding  $300 \mu\text{g}/\text{m}^3$ , to be compared with the World Health Organization (WHO) daily standard of  $70 \mu\text{g}/\text{m}^3$ , and that of Benin which is  $100 \mu\text{g}/\text{m}^3$  over the year and  $230 \mu\text{g}/\text{m}^3$  per 24 hours. This pollution is responsible for many respiratory diseases.
- Applying WHO formulas, it is estimated that the increase in mortality in Cotonou due to dust is between 4 and 5 per cent, with an increase in medical consultations or hospitalization of about 1,966 persons per year out of a total of 30,000 cases of declared respiratory diseases.

In addition, analyses carried out on carbon monoxide (CO) concentration in the air in Benin revealed a level of CO concentration outside the city centre 10 times lower than the concentration observed at a few major intersections (Program for Transport Policies in Sub-Saharan Africa 2001).

#### 6.3.2.2. Air quality in the Project area

The Project area is located in a rural zone, at a distance from the city of Cotonou and Abomey-Calavi. It is in an area dedicated to agriculture where no industrial activities potentially generating atmospheric emissions have been observed.

As explained previously, air quality analysis has been performed on the Project site for this ESIA. Two air samplings stations have been installed in the Project area with passive samplers' tubes positioned on site for 7 days, and a measurement of particulate matters was performed. Associated results are provided in the 2 tables below. The Figure 44 illustrates the location. Both IFC and national regulation provide limit values for nitrites, sulfur dioxide, ozone but not for hydrogen sulfide.

The IFC EHS General Guidelines recommend using the WHO Ambient Air Quality Guidelines (WHO AAQG) (2005). The WHO AAQG recommends a guideline value for hydrogen sulphide which is based on the Lowest-observed-adverse-effect level (LOAEL) of  $15 \text{ mg}/\text{m}^3$ , the level at which eye irritation is caused. NIOSH<sup>4</sup> also provides exposure limit for workers at  $15 \text{ mg}/\text{m}^3$ . Comparatively, in a geothermally active area (Rotorua, New Zealand) airborne concentrations of hydrogen sulfide are usually sufficient to cause noticeable odours (Thom & Douglas, 1976). At one site, for one day, a 1-h mean concentration of up to  $2.0 \text{ mg}/\text{m}^3$  was reported (Thom & Douglas, 1976).

Key conclusions resulting from the baseline air monitoring include:

- Hydrogen sulfide concentrations measured on site are much lower than the guidelines.
- NO<sub>2</sub> levels were low and not significantly affected by anthropogenic emissions.
- Ozone concentrations were similarly low and did not appear to be significantly affected by anthropogenic emissions.
- SO<sub>2</sub> levels were low and not significantly affected by anthropogenic emissions.
- Particulate matter monitoring results indicated some influences from anthropogenic emissions (traffic).

<sup>4</sup> The National Institute for Occupational Safety and Health (NIOSH) – US National Institute

In general, values on site are all below limit values and are not expected to lead to health or environment issues.

**Table 25 Air quality results**

N°	Unit	Air 1	Air 2	National regulation <sup>(1)</sup>	IFC <sup>(2)</sup>
Hydrogen sulfide (H <sub>2</sub> S)	µg/m <sup>3</sup>	17,83	17,83	-	-
Nitrites (NO <sub>2</sub> )	µg/m <sup>3</sup>	3,09	4,3	100	40
Sulfur dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	<0,057	1,06	80	20
Ozone	µg/m <sup>3</sup>	21,78	19,76	91,6	100

(1) Decree No. 2001-110 of 4 April 2001, article 3

(2) Environmental, health and safety guidelines, general EHS guidelines. IFC, 2007 (based on WHO 2005)

**Table 26 Dust sampling results**

Particles	Unit	Air 1	Air 2	Air 3	Air 4	Air 5	Air 6	Air 7	National regulation <sup>(1)</sup>	IFC <sup>(2)</sup>
Suspended particles PM <sub>10</sub>	µg/m <sup>3</sup>	123	150	153	177	189	130	153	230	50
Suspended particles PM <sub>2.5</sub>	µg/m <sup>3</sup>	90	111	133	131	140	96	113	-	25

(1) Decree No. 2001-110 of 4 April 2001, article 3

(2) Environmental, health and safety guidelines, general EHS guidelines. IFC, 2007

Sources of air pollution are therefore very limited in the vicinity of the Project, and it is expected that air quality is good. The only source of pollution is the paved national road where heavy and light vehicles transit. However, traffic remains limited (see. § 6.5.7.5.3) and there are no traffic jams that could cause localized air quality degradation.

### 6.3.2.3. Sound environment of the site

The sound environment identified on site is limited to the cries of avian fauna and the noise generated by the machinery of residents and other users while travelling on and near the Project site. Motorized traffic remains very limited due to the small number of roads, their general condition (dirt roads) and their technical characteristics (narrow widths of 15 to 20 meters and the absence of rainwater management systems resulting in impassability during the rainy season). These roads can often only accommodate small motorcycles and agricultural machinery, which have often low noise levels.

Noise measurements have been conducted in the Project area. Stations location is illustrated in Figure 44. Results are as follow:

**Table 27 Noise measurements level**

	Station 1	Station 2	Station 3	Station 4	Station 5
Environment	Close to Agbodjedo In <i>Accasia auriculiformis</i> plantation	Close to Anavie In ananas crop	Close to Djitin Aga In agricultural land	Close to Zebe In agricultural land	Central area pf GDIZ In agricultural land
Background sound	Friction of leaves due to wind	Friction of leaves due to wind	Friction of leaves due to wind	Friction of leaves due to wind	Friction of leaves due to wind

	Station 1	Station 2	Station 3	Station 4	Station 5
Specific sound	Traffic (moto)	Traffic (car)	Traffic (car)	Rooster cry	Traffic (motos)
Noise level	Between 45 & 65 dB(A)	Except peaks at 70 dB(A), noise level is mainly around 45 dB(A)	Except peaks at 70 dB(A), noise level is mainly around 50 dB(A)	Noise level is mainly around 45 dB(A)	Except peaks at 70 dB(A), noise level is mainly around 45 dB(A)

In general, the study area therefore maintains a low noise level, where sources mainly come from natural sources such as wind. This quiet environment is punctually disturbed with noise from human activities (traffic). Regarding stations located at site boundary and at the edges of the villages, ambient noise is quite low. As a comparison, the figure below provides typical noise level of specific activities.



Figure 51 Noise level scale

### 6.3.3. Geological, topographical and pedological characteristics

#### 6.3.3.1. Geology

At the departmental level, there are 2 groups in the Atlantic Department: recent formations and the terminal continental. In the group of recent formations, we note:

- the coastal formation: along the sea, a barrier beach stretches from east to west with a width of 1 to 10 km;
- the alluvial deposits: in bands of variable width along the rivers, they are highly developed along the Oueme.

In Tori-Bossito, the geology of the surface materials is mainly characterized by materials dating from the Upper Miocene, i.e. between 5.3 and 11.6 million years ago, which consist either of quartz sands with clay or gravels with subordinated ferruginous sandstone. Alluvial deposits of shallow gravel also containing sand and clay are observed in the southern part of the municipality and in its north-western tip. Finally, recent alluvial deposits consisting of sand, clay with subordinated gravels and carbonaceous levels are observed along the main rivers (PDC 3 of Tori-Bossito, 2018).

In the municipality of Ze, the soil geology is composed of a recent sedimentary cover in the north-western zone (sandy-clay and gravel formations) and a sedimentary cover of the terminal continental on the rest of the territory (sand, clay and sandstone) (SDAC Ze, 2006).

Moreover, note that the Benin earthquake hazard is classified as very low (source: GFDRR).

#### **6.3.3.2. Pedology**

In the municipality of Tori-Bossito, like in Ze, from a pedological point of view, the soil is made up in varying proportions of a mineral fraction and an organic fraction that serves as a support for vegetation and rain-fed agriculture. Several types of soil are identified in the said municipalities with distinctions between:

- ferrallitic soils commonly known as bar soils;
- the hydromorphic soils that form the substratum of the bodies of water and shallows that punctuate the 2 municipalities;
- vertisols;
- some tropical ferruginous soils.

The soil map of the Project area is presented by the figure below.



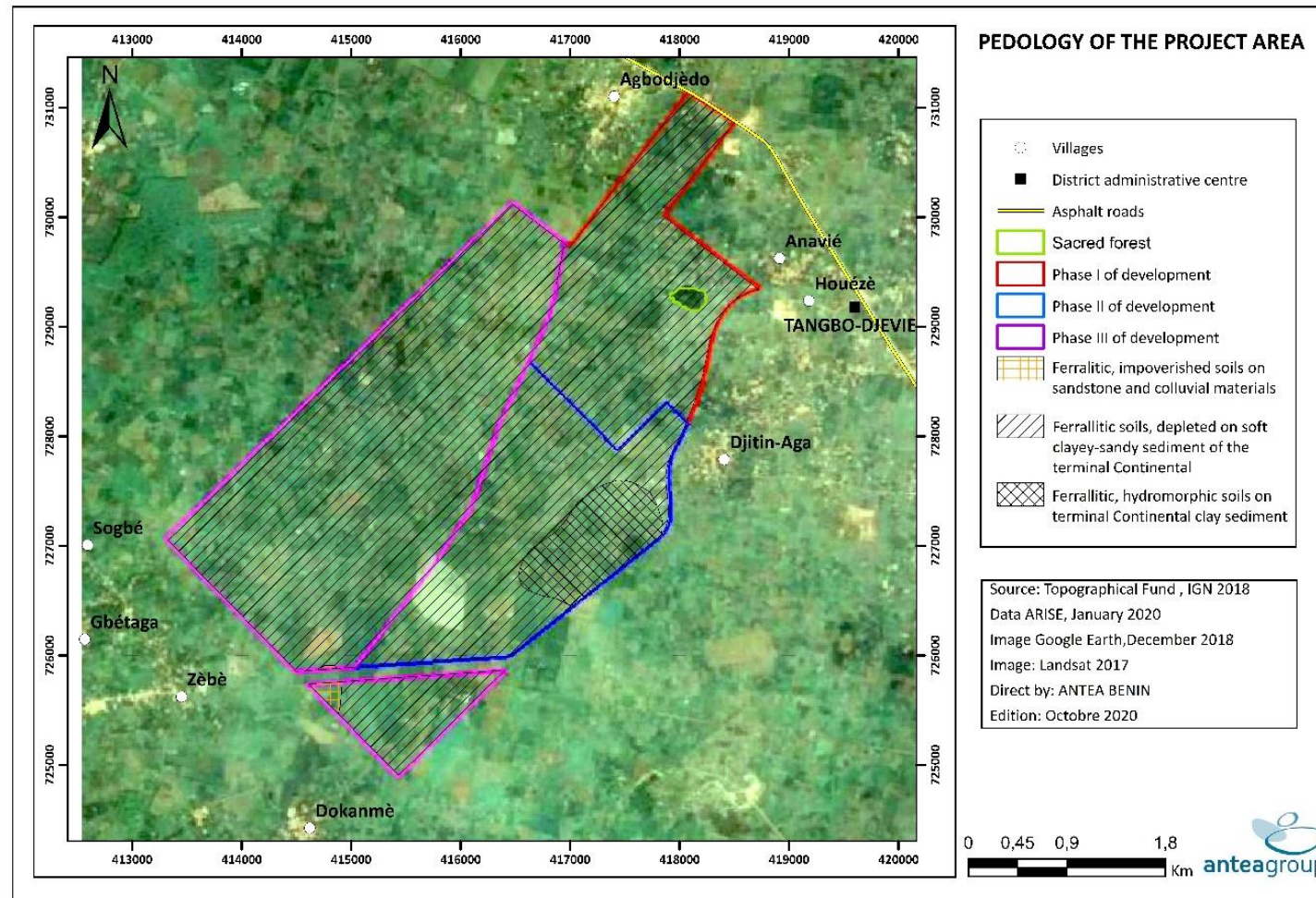


Figure 52 : Pedology of the Project area

#### **6.3.3.3. Soil quality**

Eight soil samplings were conducted. Results are provided in the table below. As a reminder, stations location is in Figure 43.

No trace of pollution or contamination (pesticides, hydrocarbons or metals) is observed. All results are above the guidelines values.



Table 28 Soil sampling results

N°	Unit	Soil 01	Soil 02	Soil 03	Soil 04	Soil 05	Soil 06	Soil 07	Soil 08	Dutch intervention values <sup>(1)</sup>
<b>Physical analysis</b>										
Dry matter	% mass MB	84,1	85,0	84,8	87,7	84,6	85,4	86,2	87,8	-
Hydrocarbon index C10-C40	mg/kg MS	<20	<20	<20	<20	<20	<20	<20	<20	-
Hydrocarbons> C10-C12	mg/kg MS	<20	<20	<20	<20	<20	<20	<20	<20	-
Hydrocarbons> C12-C16	mg/kg MS	<20	<20	<20	<20	<20	<20	<20	<20	-
Hydrocarbons> C16-C21	mg/kg MS	<20	<20	<20	<20	<20	<20	<20	<20	-
Hydrocarbons> C21-C35	mg/kg MS	<20	<20	<20	<20	<20	<20	<20	<20	-
Hydrocarbons> C35-C40	mg/kg MS	<20	<20	<20	<20	<20	<20	<20	<20	-
<b>Metals</b>										
Chromium (Cr)	mg/kg MS	73	30	43	38	50	53	37	31	380
Nickel (Ni)	mg/kg MS	7,0	8,0	9,0	6,0	6,0	8,0	6,0	4,0	310
Copper (Cu)	mg/kg MS	14	25	14	9,0	14	15	10	6,0	190
Zinc (Zn)	mg/kg MS	16	15	14	10	12	15	12	9,0	720
Arsenic (As)	mg/kg MS	3,0	<2,0	2,0	<2,0	<2,0	2,0	2,0	<2,0	55
Cadmium (Cd)	mg/kg MS	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	12
Mercury (Hg)	mg/kg MS	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	10
Lead (Pb)	mg/kg MS	13	15	13	<10	10	13	<10	<10	530
<b>Semi-volatile chlorinated hydrocarbons</b>										
Aldrin	mg/kg MS	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	0,32
o, p'-DDD	mg/kg MS	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	34
p, p'-DDD	mg/kg MS	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	34
o, p'-DDE	mg/kg MS	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	2,3
p, p'-DDE	mg/kg MS	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	2,3
Dieldrin	mg/kg MS	<0,16	<0,16	<0,16	<0,15	<0,16	<0,16	<0,15	<0,15	-

N°	Unit	Soil 01	Soil 02	Soil 03	Soil 04	Soil 05	Soil 06	Soil 07	Soil 08	Dutch intervention values <sup>(1)</sup>
alpha-Hexachlorocyclohexane	mg/kg MS	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	17
beta-Hexachlorocyclohexane	mg/kg MS	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	5
gamma-Hexachlorocyclohexane (Lindane)	mg/kg MS	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	1
delta-Hexachlorocyclohexane	mg/kg MS	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	-
epsilon-Hexachlorocyclohexane	mg/kg MS	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	<0,06	-
<b>Light chlorobenzenes</b>										
1,2,3-Trichlorobenzene	mg/kg MS	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	11
<b>Extractable pesticides at pH 2</b>										
2,4-D	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
2,4,5-T	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
2,4-DB	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Bentazon	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Bromoxynil	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Clopyralid	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Dicamba	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Dichloroprop	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Ioxynil	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
MCPA	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	4
MCPB	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Mecoprop	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Picloram	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Metsulfuron-methyl	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Metosulam	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
<b>Extractable pesticides at pH 7</b>										

N°	Unit	Soil 01	Soil 02	Soil 03	Soil 04	Soil 05	Soil 06	Soil 07	Soil 08	Dutch intervention values <sup>(1)</sup>
Alachlor	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Aldicarb	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Ametryn	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Atrazine	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	0,71
Azinphos-ethyl	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Bifenox	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Bromacil	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Buturon	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Carbaryl	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	0,45
Carbetamide	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Carbofuran	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	0,02
Chlorfenvinphos	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Chloridazon	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Chloroxuron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Chlorotoluron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Crimidine	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Cyanazine	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Desethylatrazine	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Desethylterbutylazine	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Desisopropylatrazine	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Desmetryne	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Diazinone	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
2,6-Dichlorobenzamide	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Diflubenzuron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Dimefuron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-

N°	Unit	Soil 01	Soil 02	Soil 03	Soil 04	Soil 05	Soil 06	Soil 07	Soil 08	Dutch intervention values <sup>(1)</sup>
Dimethoate	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Diuron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Ethidimuron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Ethofumesate	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Fenuron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Flazasulfuron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Hexazinon	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Isoproturon	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Lenacil	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Linuron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Metalaxyl	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Metamitron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Metazachlor	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Methabenzthiazuron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Metobromuron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Metolachlor	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Metoxuron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Metribuzin	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Monolinuron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Monuron	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Napropamide	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Pendimethalin	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Prometryne	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Propazine	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Propoxur	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-

N°	Unit	Soil 01	Soil 02	Soil 03	Soil 04	Soil 05	Soil 06	Soil 07	Soil 08	Dutch intervention values <sup>(1)</sup>
Propyzamide	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Sebutylazine	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Simazine	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Tebutam	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Terbutryne	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Terbuthylazine	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
Triadimenol	mg/kg MB	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	-
(1) Groundwater Target Values and soil and groundwater Intervention Values, Soil remediation circular 2013 (Dutchland)										
Intervention values indicate when the functional properties of the soil for humans, plants, and animals is seriously impaired or is in danger of being so.										

#### 6.3.3.4. Topography

The relief of the Project site is a gently rolling plateau, consisting mainly of ferrallitic soils.



(Source: Antea, november 2019)

**Figure 53 : Morphological aspect of the site**

This plateau generally has a slight north-south inclination, towards the stream running through the village of Anavie (a village with the same name as a village in the study area) which is called the Lama River. This village is located to the west of the Project area along the river. Depressions are observed in some places and especially in the southern part (Tori-Bossito). Relatively flat terrain is also present. The soils are generally poor in organic matter with a low exchange capacity and low water retention capacity, which favours runoff rather than infiltration.

The figure below shows the contours of the study area at different elevations. This figure also shows the depression locations on the site. The highest points of the site are at the edge of the site and much higher in the northern part of the site. The lowest points are in the southern part of the site. The gradient becomes steeper as one moves from north to southeast.



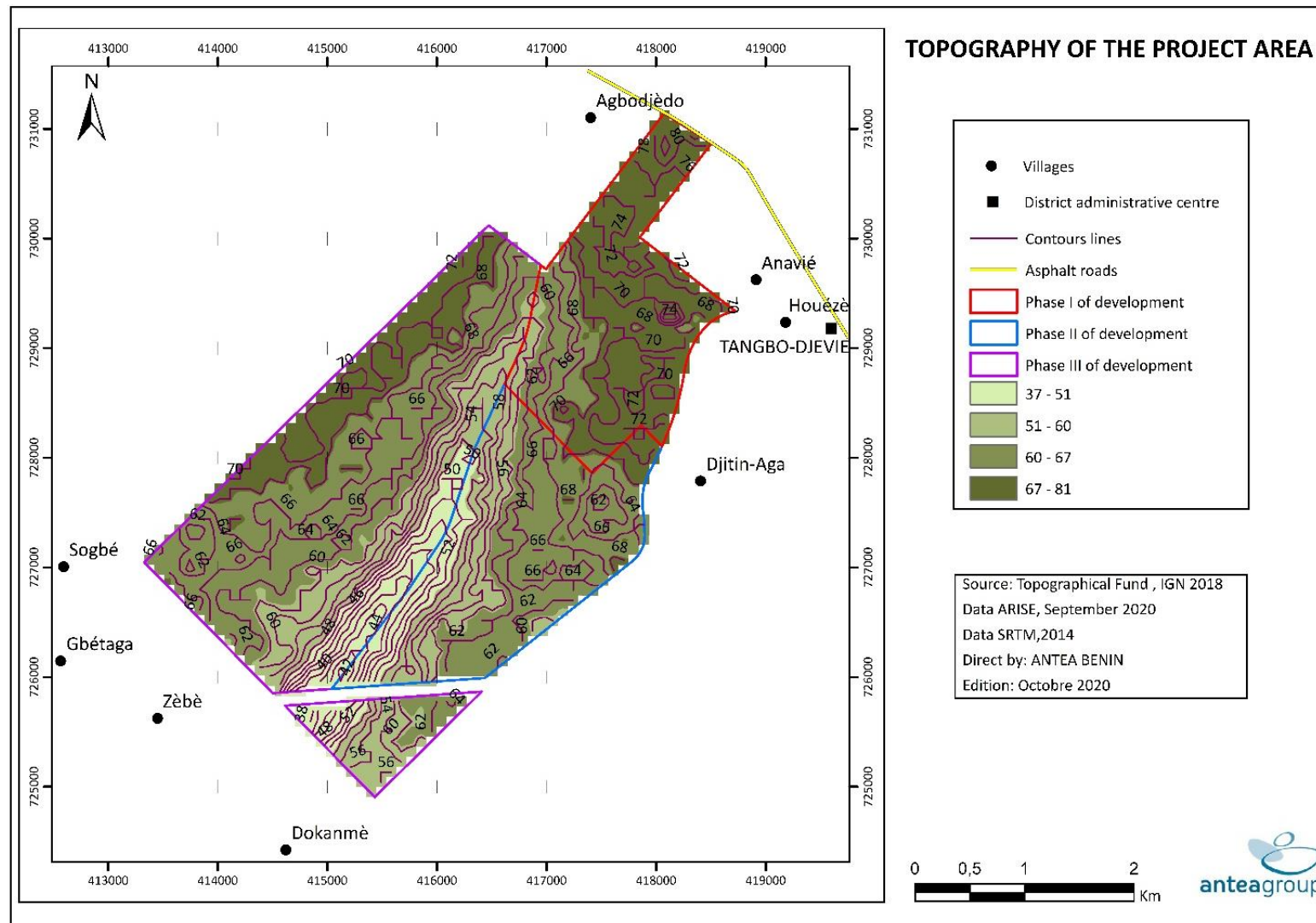


Figure 54 : Topography of the Project area

### 6.3.4. Hydrography and hydrogeology

The hydrographic network in the study area, which is poorly developed, is characteristic of the southern Benin area and marked by a few rivers flowing into the coastal lagoon system.

#### 6.3.4.1. Watershed and drainage patterns

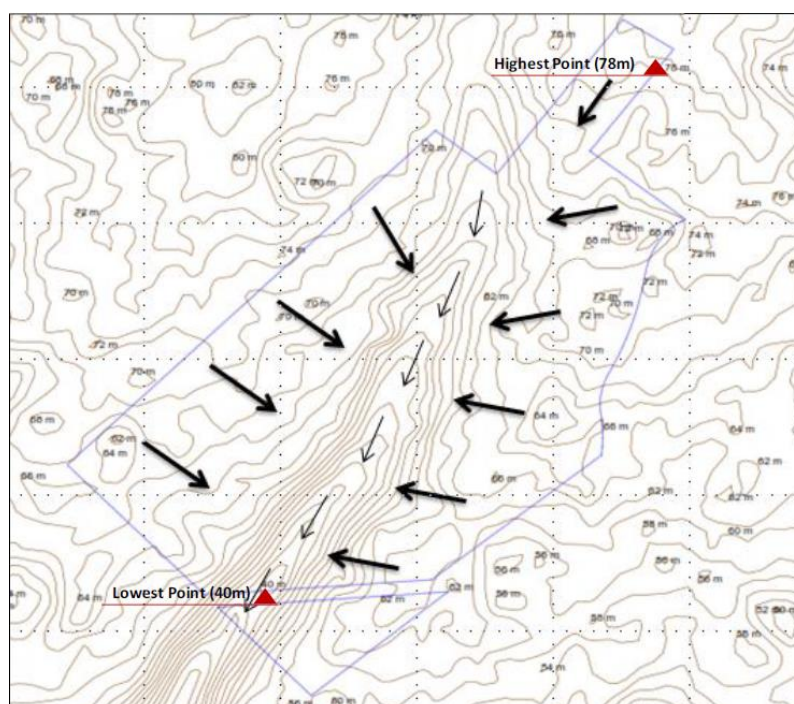
The watershed of the study area is located on the coastal sedimentary basin, which holds 32% of the potential exploitable water resources, with an annual water recharge of  $0.05 \text{ mm}^3/\text{km}^2$  (SCET-Tunisia/Turkpak-International/DH, 1991) and which is made up of several slopes.

On the Project site, these slopes constitute routes through which runoff water flows and converges towards its outlet located to the west of the site (the stream running through the village of Anavie). The site has an undulating steep gradient from its periphery to the central portion. The north-east corner of the site has a higher altitude of +80.000m MSL. The altitudes of peripheral boundaries of the site varies between +80.000 to +40.000m MSL with the lowest altitude located at south-west corner. Locally, 2 or 3 small local depressions exists.

The arrows displayed on the figure below indicating the natural ground slope that falls towards the central portion from peripheral sides of the Project boundary. The central portion has a steep linear slope in a northsouth direction creating a valley.

The existing drainage pattern largely follows the natural topographical conditions of the Project site that conveys the runoff into the central valley and flows further south outside the Project boundary.

The installation of pineapple crops on certain slopes reduces the intensity of surface water runoff. This situation leads to the observation of temporary water stagnation and low levels in certain areas of the site during the rainy season.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

Figure 55 Site drainage

#### 6.3.4.2. Rivers and wetlands

The Atlantic Department has a fairly extensive hydrographic network. Among the rivers we can mention the Couffo, which marks the western border of the department with the department of Mono. This river runs through the department for nearly 50 km and flows into Lake Aheme. The Couffo is subject to heavy floods that reach their peak during the second rainy season. The Oueme River is the main contributor to Lake Nokoue. The Atlantic Department also has 22,500 ha of lakes and lagoons.

In the south of the department, there is a vast lagoon system attached to lakes Nokoue and Aheme. It is bordered by a sandy barrier coastline, 2 to 5 km wide and punctuated by lagoons and marshes. This lagoon complex is increasingly salty, in this case Lake Aheme and Lake Nokoue.

The map below shows the location of the Project area (red rectangle) in the hydrographic network of southern Benin.



(Source: Adam and Boko, 1993)

**Figure 56 : Hydrographic map of Benin**



The hydrographic network in Tori-Bossito is poorly supplied. It is essentially made up of lowland swamps which in winter are real bodies of water. These swamps, which have their source in the Aoute River (municipality of Allada) and punctuate the districts of Avame and Tori-Cada mainly but are also present in the districts of Tori-Gare and Tori-Bossito (PDC 3 of Tori-Bossito, 2018).

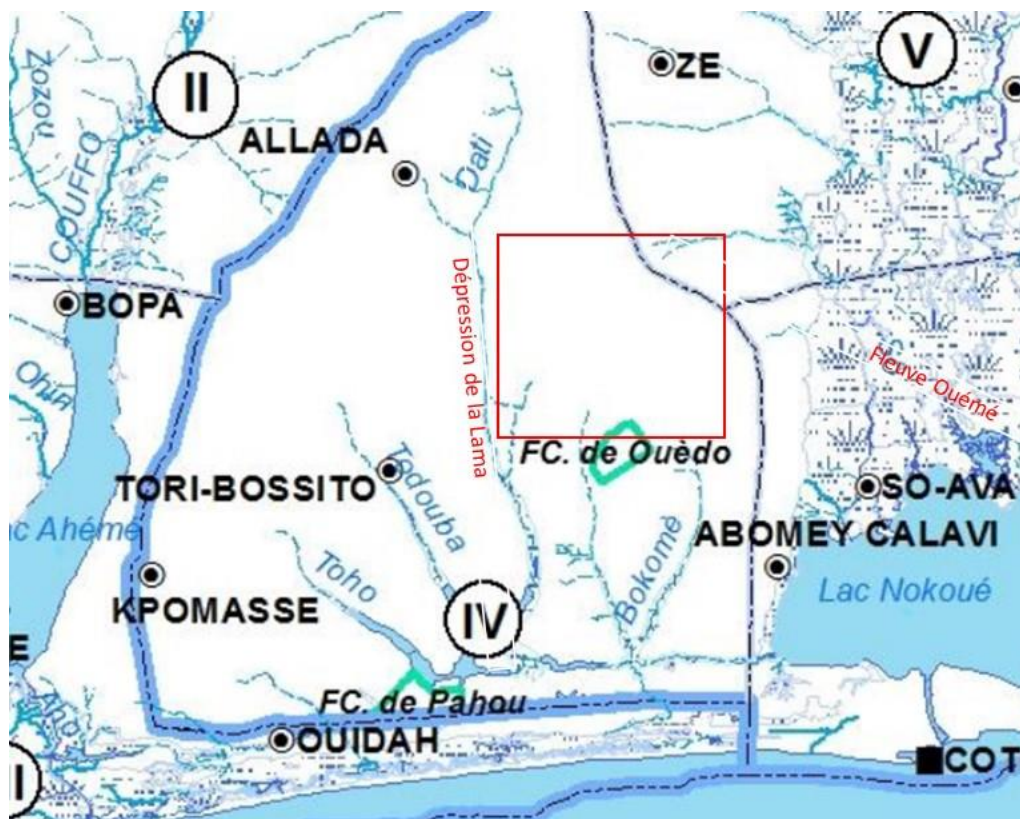
The hydrographic network in the municipality of Ze is very localized. In fact, only the northern and eastern zones are irrigated by tributaries of the Oueme River such as the Sô River. These localities are crossed by the tributaries of the Oueme River and offer the opportunity for a third cultural cycle; flood-recession cultivation from November to March each year. Several shallows dot the territory of the municipality of Ze (PDC 3 of Ze, 2019).

The Project site is located between 2 rivers of different sizes: the Oueme River in the east (about 25 km from the Project site), and the Lama Depression or Lama River in the west (2-3 km from the Project site) which flows into the Cotonou lagoon system.

The Lama Depression is a small valley where the water stagnates in the dry season, forming a swampy area filled with water hyacinths and other aquatic plants, and where fish farming and market gardening are practiced.

Despite the depression present on the site and visible on the topographic maps, there are no streams on the site, no lowland swamp areas, and therefore no wetlands. On the other hand, runoff from the site probably flows into the Lama River, especially during the rainy season.

The map below shows the location of the Project site (red rectangle) in relation to the 2 rivers that surround it.



(Source: HOUETO Ogoubiyi Felix, Mapping of sacred forests in Ramsar sites 1017 and 1018, 2013)

Figure 57 : Hydrographic chart of the Project area

However, the local depressions contain a pool of water for the period until the water lost due to evapo-transpiration and infiltration losses.

#### 6.3.4.3. Groundwater

To date, there is no precise information on the hydrogeological characteristics of the Project area, which makes it difficult to obtain an accurate understanding of the quantity and quality of the available groundwater resources. The nature, typology, capacity and size of the water table supplying the local populations in particular are not known.

However, the mobilisation of this groundwater is effective since several hydraulic works are noted in the study area, in particular: the village water supply system (AEV), boreholes, traditional wells and modern wells:

- **traditional wells:** they are erected in houses and public squares by the population for collective use. They are generally shallow. Their depth varies between 14 and 20 m. These wells are generally uncovered and therefore exposed to pollution;
- **modern wells:** they are the work of the DG Water, NGOs, cooperation and support from international partners. Beneficiaries of this type of work are village associations, religious groups, etc. Unlike traditional wells, these wells are deeper and are equipped with a human-powered drawing device;
- **village water conveyances:** these works are of several kinds, i.e. standpipes connected to water towers installed in the districts.



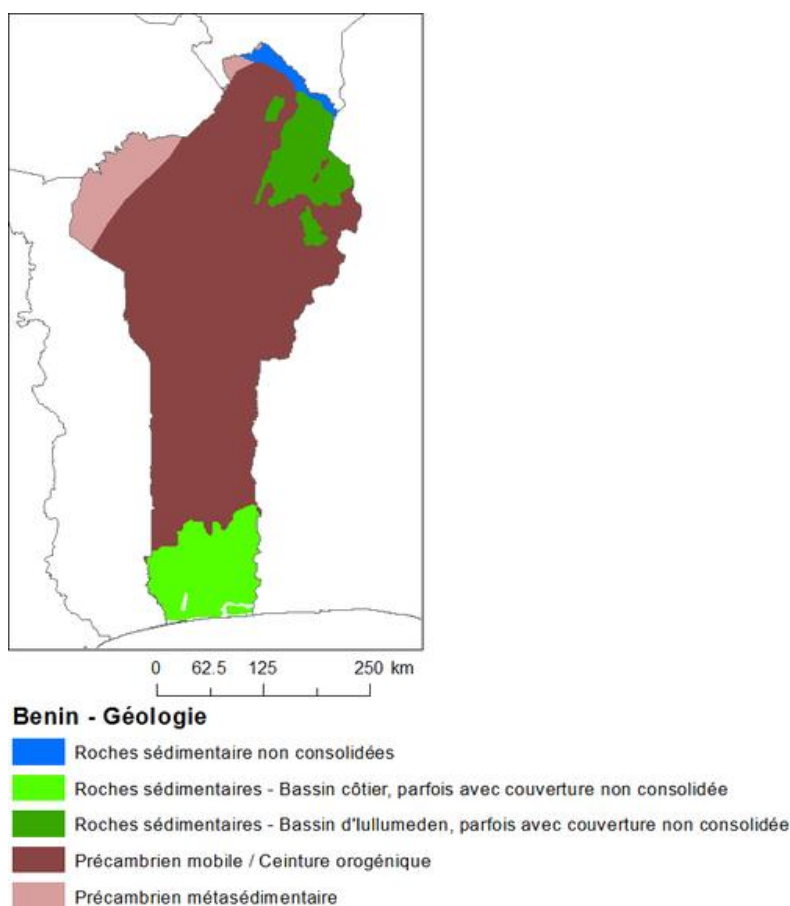
(Source: Antea, November 2019)

**Figure 58 : View of a water tower on the Project site in Tangbo- Djevie and of a traditional well without cover**

The figure below presents the geological map of Benin. This map shows that the Project site is located on the coastal basin. Four main aquifers make up the coastal basin and are the main source of drinking water for southern Benin. They are, in decreasing order of age, the Upper Cretaceous, Paleocene, Terminal Continental and Quaternary aquifers. They are separated by clays and marls of low permeability and can be confined or unconfined depending on the local geology.

Flows are generally between 2 and 50 l/s. The transmissivity is generally 80 to 900 m<sup>2</sup>/d. The storage coefficient is generally 10<sup>-6</sup> to 10<sup>-5</sup>.

Coastal sedimentary aquifers are generally 20 to 150 m thick, with boreholes reaching depths of 10 to 100 m. Where aquifers are unconfined, the depth of the aquifer can vary from 5 to 50 m below ground level (Boukari, Totin, Upton, Ó Dochartaigh and Bellwood-Howard, 2018).



(Source: Boukari, Totin, Upton, Ó Dochartaigh et Bellwood-Howard, 2018)

**Figure 59 : Geological map of Benin**

#### 6.3.4.4. Water quality and uses

At the study area level, the presence of agricultural activities leads to problems of probable pollution of surface water by runoff and groundwater by infiltration, due to the use of fertilizers, agricultural pesticides and the presence of cattle farms.

The Project area falls within Mio-Pliocene aquifer with an expected groundwater level at 48 m under the surface.

Unconfined aquifers are particularly vulnerable to contamination from latrines and agriculture, especially where the water table is very shallow. In addition, traditional uncovered wells can collect dead leaves, dust and other wind-blown waste.

Results of water quality are provided in the table below. As a reminder, stations location is in Figure 43. All water samplings were conducted in private wells (between 45-50 m-depth when known) located in crops. Results show a lower mineralisation (conductivity < 400  $\mu\text{S}/\text{cm}$ ) and a typical groundwater pH ( $5,5 < \text{pH} < 8$ ). Regarding pH, results show a low pH water (less than pH 7), more likely to be corrosive.

No hydrocarbon contamination exists in water samplings and in general, results are lower than guidelines, both national and international. Lead concentration at station 4 is above WHO guidelines for drinking quality but lower than the one for agricultural purposes and national regulation.

Note that zinc was analyzed in station 4 and 5, but the concentration is not significative. WHO guidelines state that drinking-water seldom contains zinc at concentrations above 0.1 mg/l.



Table 29 Results of water quality sampling

Nom de l'échantillon	Unité	GW_01	GW_02	GW_03	GW_04	GW_05	GW_06	National régulation <sup>(1)</sup>	WHO (2017) <sup>(2)</sup>	NEPM Australia <sup>(3)</sup>
<b>Global Parameters</b>										
Odour	-	No	No	No	No	No	No	-	-	-
pH	-	6,41	5,2	5,9	5,52	5,55	5,48	6,5 < X < 8,5	-	-
Temperature	°C	28,4	28	29	29,8	28,7	28	-	-	-
Conductivity	µS/cm	375	63	133	201	100	147	-	-	-
Aspect	-	Clear	Clear	Clear	Clear	Clear	Clear	-	-	-
<b>Metals</b>										
Arsenic (As)	µg/l	<3,0	<3,0	<3,0	<3,0	<3,0	<3,0	50	10	100
Cadmium (Cd)	µg/l	<1,5	<1,5	<1,5	<1,5	<1,5	<1,5	5	3	10
Chrome (Cr) total	µg/l	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	50	50	1000
Copper (Cu)	µg/l	<5,0	48	41	83	75	12	2000	2000	200
Mercury (Hg)	µg/l	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	1	6	2
Nickel (Ni)	µg/l	<10	<10	<10	<10	<10	<10	20	70	20
Lead (Pb)	µg/l	<10	<10	<10	37	<10	<10	50	10	200
Zinc (Zn)	µg/l	<50	<50	<50	130	100	<50	-	-	2000
<b>Hydrocarbon</b>										
Hydrocarbon index C10-C40	mg/l	<0,05	<0,05	<0,05	<0,05	<0,16	<0,05	-	-	-
Hydrocarbons> C10-C12	mg/l	<0,05	<0,05	<0,05	<0,05	<0,16	<0,05	-	-	-
Hydrocarbons> C12-C16	mg/l	<0,05	<0,05	<0,05	<0,05	<0,16	<0,05	-	-	-
Hydrocarbons> C16-C21	mg/l	<0,05	<0,05	<0,05	<0,05	<0,16	<0,05	-	-	-
Hydrocarbons> C21-C35	mg/l	<0,05	<0,05	<0,05	<0,05	<0,16	<0,05	-	-	-
Hydrocarbons> C35-C40	mg/l	<0,05	<0,05	<0,05	<0,05	<0,16	<0,05	-	-	-

(1) Decree No. 2001-094 of 20 February 2001 setting the standards for drinking water quality, article 17

(2) Guidelines for drinking water

(3) Guidelines for agricultural irrigation

Above guidelines

#### 6.3.4.5. Sources of pollution

In the Atlantic Department in general, and in the municipalities of Tori-Bossito and Ze in particular, the dominant activity is agriculture. The most common crops and plantations are oil palm, teak, pineapple, manioc and market gardening. In order to ensure the profitability of this activity, farmers use several chemical fertilizers, namely: NPK (nitrogen, phosphorus, potassium), Urea, etc.

This practice is not without consequences on the environment and especially on water resources. Indeed, after using these different chemical fertilizers, they infiltrate the soil and reach the water table. We are therefore witnessing a contamination of this water table which, although it has not been measured to date, may prove to be significant in view of the almost exclusive use of land by agriculture.

#### 6.3.5. Landscape

The landscape is seen as a part of the earth's surface that is formed by a complex of interaction between rocks, water, air, plants, animals and humans, which in its outward appearance forms a perceptible whole (Houndagba, 2014). This perception changes under the influence of the major factors that make it up. These changes can be seen as one of the important elements influencing the ecological balance at the landscape level in the study area. The Study Area landscape is being significantly altered by the increase in agricultural areas and some residential structures.

A study carried out on the spatial dynamics and structure of the landscape in 2019 in the study area revealed that natural formations such as degraded forests, tree and shrub savannas saw their number of tasks (relatively homogeneous formations), their surface area and their size decrease from 1986 to 2018. On the other hand, anthropogenic formations such as field and fallow mosaics and those under palm trees increased the proportion of their area from 27.75% and 6.29% in 1986 to 42.82% and 11.33% respectively in 2018. In terms of task dominance (LPI: Total Percentage of Landscape), field and fallow mosaics have the highest proportion (37.15%) in 2018 (Tente and al. 2019).

It then emerges that from 1986 to 2019 the landscape will be closed due to the increase in agricultural areas.

The landscape of the study area is therefore characterized by mosaics of fields and fallow land and those under palm trees. The following plate shows areas being cleared for agriculture.



(Source: Antea, November 2019)

**Figure 60 : Clearing space for agricultural activities in the Project area**

## 6.4. Biological environment

### 6.4.1. General biogeographic context of the area

#### 6.4.1.1. General state of habitats and ecosystems

Benin, because of its maritime facade to the south, its elongated shape in the hinterland, and its position within the "Dahomey Gap" (a mixed zone of dry forest and savannah that stretches along the coast in Benin, Togo and Ghana, thus separating the forest area that covers most of the southern part of the region into 2 distinct parts), is marked by a diversity of geomorphological, geological, hydrographic, edaphic, climatic and demographic features that explain the diversity and fragmentation of plant formations and the variability in the floristic composition of plant groups (A. Akoegninou et al, 2006, p. XII).

In Benin, the annual growth rate of 3.5 % (INSAE, 2015, p. 11) represents a factor of pressure on natural vegetation through different forms of land use for agricultural, pastoral and urbanization purposes. The presence of national regulation to conserve natural plant formations has not been able to play an effective role in biodiversity conservation at the national level.

In the districts of Tangbo-Djevie and Tori-Cada, and particularly in the Project site, large, continuous areas of natural ecosystems are being transformed into a network consisting mainly of agricultural land (fields) and scattered residential areas. The Project site, which once had large islands of dense semi-deciduous forest (Aziz Ballouche *et al.*, 2000), has been transformed into agricultural areas. In recent years, only a few remnants of natural vegetation have been reconstituted there. The Project site is therefore an example of the progressive and continuous degradation of natural plant formations in a context of strong anthropogenic pressures. These pressures are justified by the proximity of the Project site (less than 30 km) to the capital, Cotonou.

#### 6.4.1.2. Presence of protected areas

IUCN defines a protected area as "a clearly defined geographical space that is recognized, dedicated and managed, by any effective legal or other means, to ensure the long-term conservation of nature and the ecosystem services and cultural values associated with it".

The Convention on Biological Diversity defines a protected area as "a geographically defined area that is designated or regulated and managed to achieve specific conservation objectives". A protected area is therefore an area whose primary objective is the conservation of nature.

In Benin, protected areas are defined according to Decree No. 2011-394 of 28 May 2011 establishing the modalities of conservation, development and sustainable management of wildlife and its habitats in the Republic of Benin, as "all continental or marine areas benefiting from special protection and management measures". They include classified forests, integral nature reserves, national parks, protected marine areas, wildlife reserves, special reserves or wildlife sanctuaries and hunting areas.

In view of these different definitions, it should be noted that no form of protected area is present on the Project site. The figure below indicates that the nearest protected area is the Ouedo classified forest located about 10 km south of the Project site.

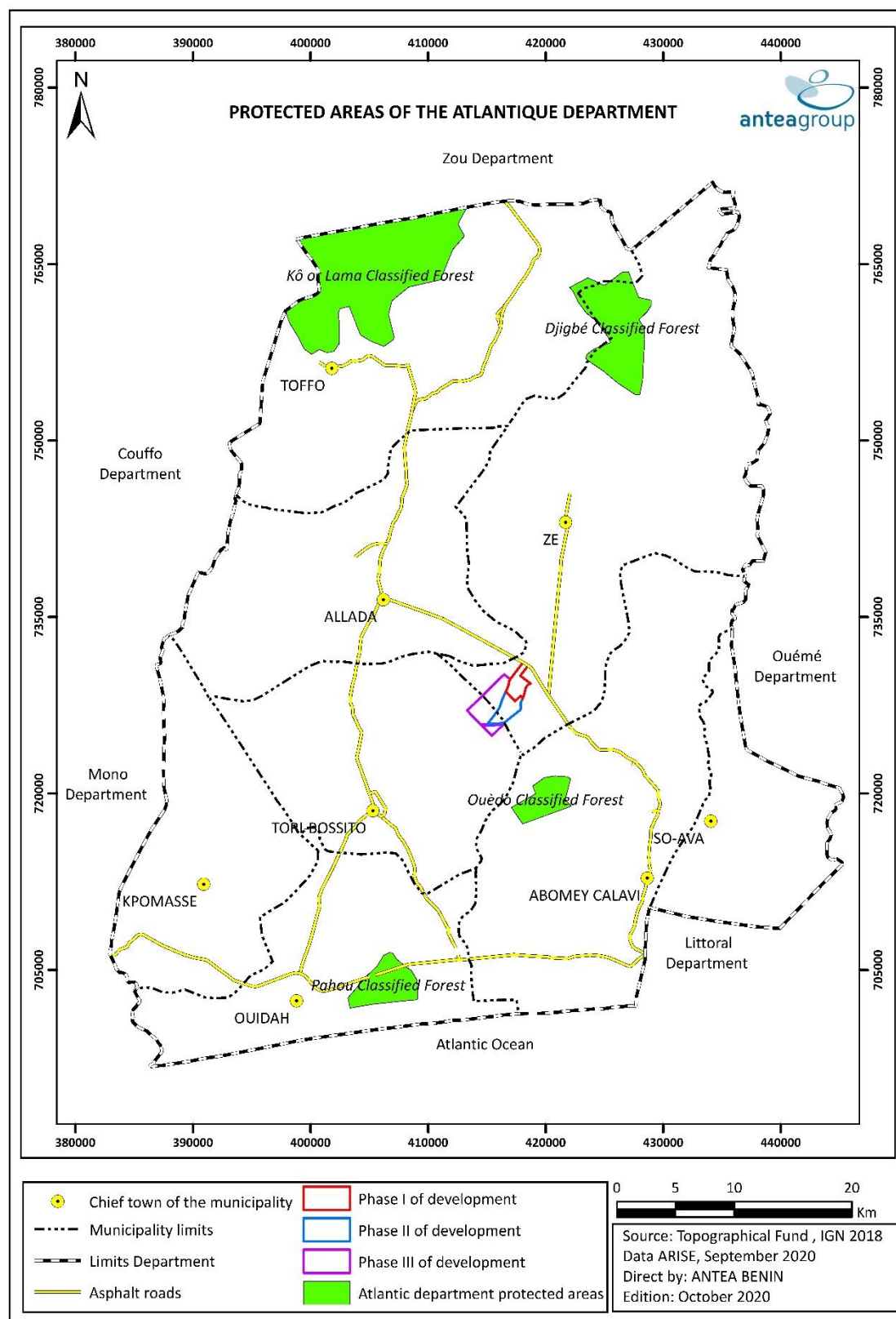


Figure 61 : Distribution of protected areas in the Atlantic Department



#### 6.4.1.3. Threats to biodiversity

##### **Overall threats**

Under the effect of natural and anthropic factors, plant formations change their physiognomy over time. Depending on the climate, the relief and the soil as well as human activity are the determinants of the dynamics of plant groups across the landscape (I. Toko Imorou et al. 2010, p. 14).

As the Project site is in an area of high pineapple production, the main threat to biodiversity is the destruction of natural vegetation in favour of agricultural land and the use of wood for cooking and construction. Pineapple being a heliophilic crop, it does not support agroforestry systems. As a result, the natural vegetation must be completely destroyed to make way for pineapple plantations.



(Source: Antea, November 2019)

**Figure 62 : Pineapple cultivation on the Project site**

The main threat to wildlife essentially comes from the destruction of habitats and the hunting pressure. In the Project area, in the absence of large mammals, rodents are the most affected because of they are hunted for meat but also for their organs and other by-products used in traditional medicine (medico-magical use).

The only residual natural habitat of the site (Anavie sacred forest) still hosts some species of endangered fauna in Benin (Benin red list). But in the short term, without conservation measures, this fauna will disappear because of the surrounding habitats fragmentation and the large human presence.

##### **Invasive species**

Invasive species are also present on the site. These species are now considered one of the most important causes of biodiversity loss in the world.

They can cause several socio-economic and environmental problems. Most of these species have a strong reproductive capacity. Indeed, they produce many fertile seeds that are easily dispersed by the wind and capable of quickly colonizing open habitats or adapting to changing landscapes. As a result, they quickly occupy space in the environment and prevent the development of other species. This situation creates an imbalance in the environment in which they develop (Fifth national report on the implementation of the Convention on Biological Diversity in Benin, 2014).

Invasive species found on site are the following:



Table 30 Invasive species recorded on site

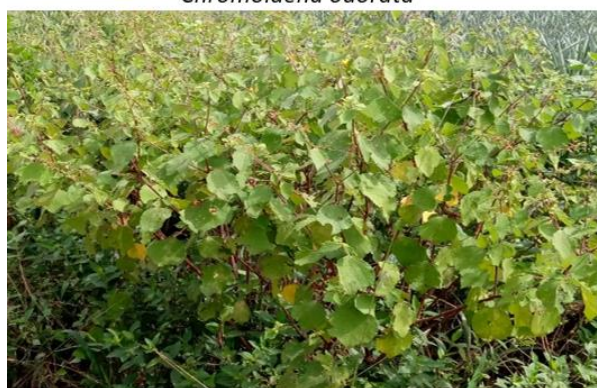
Species	Family	Common name
<i>Acalypha ciliata</i>	Euphorbiaceae	
<i>Bidens pilosa</i> L.	Asteraceae	
<i>Chromolaena odorata</i>	Asteraceae	
<i>Commelina benghalensis</i> L.	Commelinaceae	Day flower
<i>Commelina diffusa</i>	Commelinaceae	
<i>Cyperus iria</i>	Cyperaceae	
<i>Desmodium velutinum</i> (Willd.) DC.	Fabaceae	
<i>Digitaria horizontalis</i>	Poaceae	
<i>Flueggea virosa</i> (Roxb. ex Willd.) Voigt	Euphorbiaceae	-
<i>Imperata cylindrica</i>	Poaceae	Coton grass
<i>Mitracarpus hirtus</i>	Rubiaceae	
<i>Panicum maximum</i> Jacq.	Poaceae	
<i>Paspalum orbiculare</i>	Poaceae	
<i>Phyllanthus amarus</i> Schum. and Thonn.	Euphorbiaceae	
<i>Setaria barbata</i> (Lam.) Kunth	Poaceae	
<i>Triumfetta rhomboidea</i> Jacq.	Malvaceae	
<i>Waltheria indica</i> L.	Sterculiaceae	



*Chromolaena odorata*



*Flueggea virosa*



*Triumfetta rhomboidea*



*Cyperus iria*

(Source: Antea, November 2019)

Figure 63 Invasive plant in the Project area

The presence of these species in the environment constitutes a real threat both to the ecosystem and to the native biodiversity with which they are in trophic competition. Other species such as *Chromolaena odorata* are a factor in the spread of forest fires, while farmers appreciate it positively for its capacity to regenerate soil organic matter due to its high biomass productivity (Fifth national report on the implementation of the Convention on Biological Diversity in Benin, 2014). *Chromolaena odorata* and *Hyptis suaveolens* negatively affect the abundance of palatable species in pastures and halve the regeneration density of forest species in fallow (Assogbadjo et al. 2014).

## 6.4.2. Habitat and vegetation

The complete fauna and flora report for the rainy season is placed in annex (see Annex IV).

### 6.4.2.1. Habitat of the Project area

The Project area (1,462 ha) is an agricultural area characterized by the presence of pineapple plantations (dominant plantation), cassava plantations, oil palm and tree plantations (acacia, teak and eucalyptus), food crops (corn, peanuts, etc.). Few housings, livestock and agri-food processing farms are found, but also fallow land and a small forest island (this forest is a sacred forest for the surrounding villages). In this sacred forest of Anavie, it was noted the presence of a temporary water point that forms during the rainy season.

The vegetation cover of the site is characterized by mosaics of crops and fallow land with a predominance of herbaceous and shrubby, wasteland sometimes dotted with a few feet of kapok. The plantations of tree with economic value constitute the main part of the woody flora of the site. These plantations are used by the population for various purposes: timber and service timber, palm wine.

Despite the increasing destruction of natural vegetation in favour of agriculture, there are still remnants of degraded but recovering natural vegetation in places on the site. These include open forests and dense semi-deciduous forests dominated by *Albizia spp.* and *Dialium guineense*.

The pictures below illustrate the land cover.





Forest



Plantation Gmelina



Eucalyptus plantation



Cassava crops



Entrance of the sacred forest

**Figure 64 Various habitats on the Project area**

These different plant formations can be grouped into 2 types of habitat, natural habitat and modified habitat, according IFC PS 6<sup>5</sup>. The different habitats found in the Project area are the following.

<sup>5</sup> Performance Standard 6. Biodiversity Conservation and Sustainable Management of Living Natural Resources. IFC (2012)

Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones, and reclaimed wetlands.

Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes



**Table 31 Type of habitat in the Project area**

Habitat in the Project area	Habitat area	% of the Project area	Habitat categorisation according IFC PS n°6
Forest	4.37 ha	0.29 %	Natural habitat
Natural vegetation	7.33 ha	0.50 %	Natural habitat
Plantation	677.29 ha	46.32 %	Modified habitat
Crops, fallow land, waste land	762.01 ha	52.12 %	Modified habitat
Tracks, bare soil and infrastructures	11 ha	0.8%	Modified habitat

No critical habitat according the IFC PS 6 definition was found.



Palm plantation on the site



Teak plantation on the site



Natural vegetation on the site



Invasive plant on the site

(Source: Antea, November 2019)

**Figure 65 : Habitats observed on the site**

The high human pressure of the area leads on a rapid change regarding the land occupation. Agricultural land area regularly increases, in particular for pineapple exploitation purpose, at the expense of the last relics of natural vegetation. During the investigations in the rainy season, at least 3 areas of natural vegetation were found converted to agricultural area.

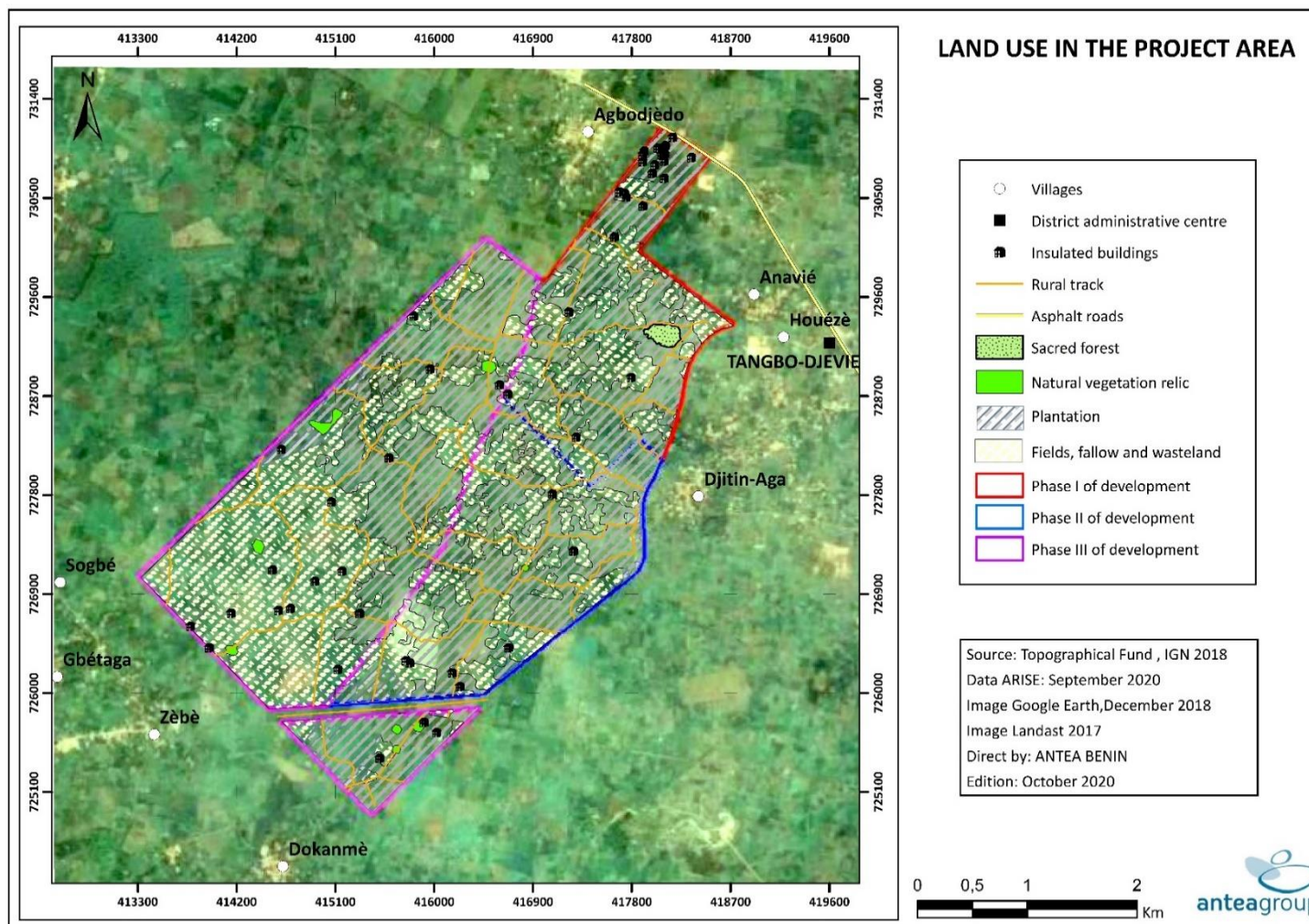


Figure 66 Land occupation and habitats in the Project area



## 6.4.2.2. Flora and vegetation

### 6.4.2.2.1. Richness and biodiversity of the Project area

The different investigations led to the inventory of 112 species in the rainy season and 92 in the dry season, with 48 species in common (a total of 156 species). The site biodiversity varies widely from the rainy season to the dry season, with a highly biodiversity in rainy season. In the forest area 45 species were recorded. The complete list of the flora inventoried species is in annex (see Annex VIII).

The species richness varies on average between 16 and 47 species per 900 m<sup>2</sup> plot.

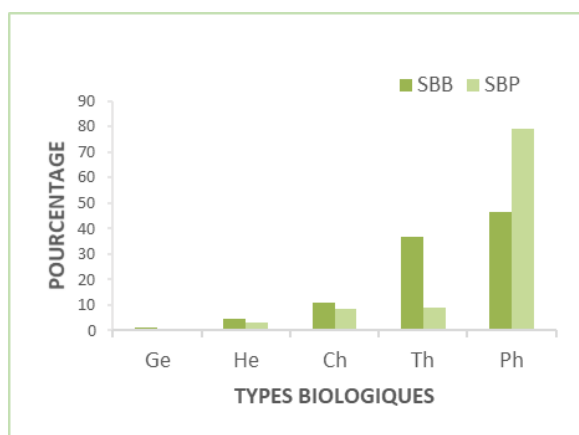
The Fabaceae, Euphorbiaceae and Rubiaceae families are best represented in the natural vegetation area. These families are characteristics of the initial habitats and the old forestry cover because it is among these that the woody plants are recruited which impart a forest physiognomy to the vegetation.

The biological spectrum represents, for a given plant grouping, the proportion of species according to their biological forms:

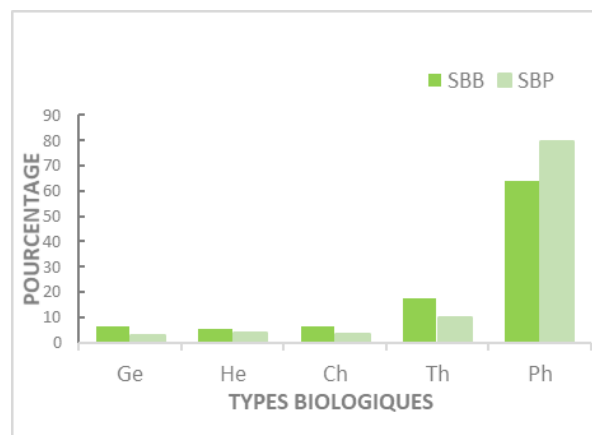
- phanerophytes - trees, shrubs or lianas;
- chamephytes – shrub more or less spread out on the ground;
- hemicryptophytes - perennial herbaceous plants;
- geophytes - plants with tubers, rhizomes or bulbs (disappearing underground during the dry season).
- therophytes – annual plants (only surviving in the form of seeds).

A distinction is made between raw spectra (scoring frequency of plants belonging to different biological forms) and weighted spectra (representing the overlap of each biological form).

The figure below shows the spectra of the biological types of the different plant formations observed during the rainy and dry seasons.



Source: (Antea, November-December 2019)



Source: (Antea, July 2020)

**Legend:** He = Hemicryptophyte; Ge = Geophyte; Ch = Chamephyte; Th = Therophyte; Ph = Phanerophyte; SBB = Raw Biological Spectrum; SBP = Weighted Biological Spectrum.

**Figure 67 Biological types during rainy and dry season**

Quantitative analysis of the spectra of the biological types indicates that Phanerophytes are, whatever the season, the most abundant (46.42% in the dry season and 64.13% in the rainy season) and the most dominant (79.05% in the dry season and 79.80% in the rainy season) life forms. The importance of Chamephytes, Hemicryptophytes and Geophytes is low whatever the season. Note the Geophytes

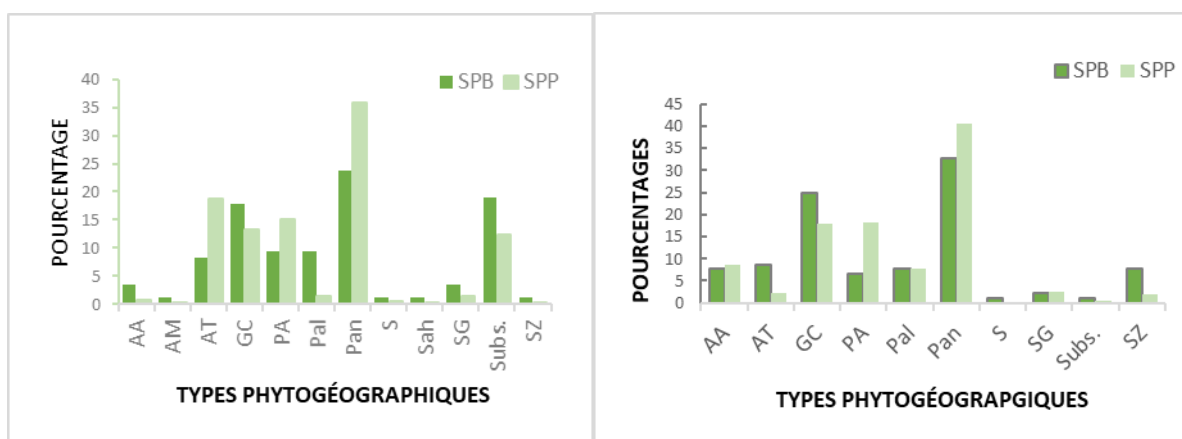


show a dominance in the rainy season compared to the dry season. This confirms their disappearance underground during the dry season and their appearance during the rainy season.

The plots (R5 and R8) where the therophytes were observed in November 2019 were found converted to agricultural land and therefore were no longer studied. This resulted in the subsequent decrease in the therophytes rate for the rainy season compared to the dry season.

Globally, given the abundance and dominance of phanerophytes, it appears that the human action has little by little gained on the ancient forest area, whose areas still spared are illustrated on site with the few relics of natural vegetation.

The figure below shows the raw and weighted spectra of the phytogeographic types of the plant formations studied.



(Source: Antea, November-December 2019)

(Source: Antea, July 2020)

**Legend:** AA = African-American; AM = Afro-Malagasy; AT = Afro-tropical; GC = Guinean-Congolese; PA = Pluri-regional African; Pal = Paleotropical; Pan = Pantropical; S = Sudanian base element species; Sah = Sahelian; SG = Sudano-Guinean; Subs. = Sub-Saharan; SZ = Sudano-Zambezian.

**Figure 68 : Spectra of phytogeographical biological types during rainy and dry season**

Analysis of the spectra of phytogeographical types shows that pantropical (Pan) species are the most abundant (23.81%) and dominant (35.74%) phytogeographical types, whatever the season, followed by the Guinean-Congolese species.

The preponderance of pantropical species (Pan), which are species with a wide geographical distribution reflects a disturbance of the local flora. The natural vegetation therefore no longer has its phytogeographical specificities (Guinean-Congolese species are not the most dominant / abundant) following its degradation.

#### 6.4.2.2.2. Flora species requiring special attention

Very few of the species found on the site are species of special status. In total, 45 species were recorded with IUCN status / beninese red list / national regulation. It appears that the highest number of protected individual species was observed in the sacred forest. The sanctification of this forest island has probably contributed to the conservation of these species on the site.

None of these are recorded as endemic or recorded with specific conservation issues, but 3 are with EN status on the beninese red list. These species are mainly located in the areas with natural vegetation, although few individuals were found outside.

The few species that are protected and require special attention are summarized in the table below.

Table 29 : Flora species recorded on site requiring special attention

Species	Common name	Beninese red list	Law 93-009 of the July 2 <sup>nd</sup> , 1993	IUCN red list	Season
<i>Acacia mangium</i>	Brown salwood			LC	Rainy
<i>Albizia adianthifolia</i>	Albizia	LC	P	LC	Rainy
<i>Albizia zygia.</i>	Albizia	LC	P	LC	Rainy, Dry
<i>Alchornea cordifolia</i>	-			LC	Dry
<i>Allophylus africanus</i>	-			LC	Rainy, Dry
<i>Antiaris toxicaria</i>	Antiaris	LC	P	LC	Rainy
<i>Azadirachta indica</i>	Neem			LC	Rainy
<i>Bauhinia rufescens</i>	-			LC	Dry
<i>carpolobia lutea G. Don</i>	-			LC	Rainy
<i>Ceiba pentandra</i>	Kapok	LC	P	LC	Rainy, Dry
<i>Celtis philippensis</i>	-			LC	Rainy
<i>Clausena anisata</i>	Horsewood			LC	Rainy, Dry
<i>Commelina benghalensis L</i>	Day flower			LC	Rainy
<i>Commelina diffusa</i>	Climbing dayflower			LC	Dry
<i>Culcasia scandens.</i>	-			LC	Rainy
<i>Cyperus iria</i>				LC	S
<i>Cyperus rotundus L.</i>	Nutgrass			LC	Rainy
<i>Delonix regia</i>	Flame tree			LC	Rainy
<i>Dialium guineense Willd.</i>	Black tamarind	LC	P	LC	Rainy, Dry
<i>Dioscorea abyssinica Hochst</i>	Dooya			LC	Rainy
<i>Dracaena arborea</i>	-			LC	Rainy
<i>Elaeis guineensis Jacq.</i>	African oil palm			LC	Rainy, Dry
<i>Ficus exasperata Vahl</i>	-			LC	Rainy, Dry
<i>Ficus trichopoda</i>	-			LC	Rainy
<i>Flueggea virosa (Roxb. ex Willd.) Voigt</i>	-			LC	Rainy, Dry
<i>Gmelina arborea Roxb.</i>	-			LC	Rainy, Dry
<i>Holarrhena floribunda</i>	-			LC	Rainy
<i>Imperata cylindrica</i>	Coton grass			LC	Dry
<i>Khaya senegalensis</i>	Caïlcedrat	EN	P	VU	Dry
<i>Mangifera indica L.</i>	-			DD	Rainy, Dry
<i>Manihot esculenta Crantz</i>	-			DD	Rainy
<i>Margaritaria discoidea</i>	-			LC	Rainy
<i>Memecylon afzelii</i>	-			LC	Rainy
<i>Milicia excelsa</i>	Ioko	EN	P	NT	Dry
<i>Mimosa pigra L.</i>	-			LC	Rainy
<i>Pavetta corymbosa</i>	-			LC	Rainy
<i>Pouteria alnifolia</i>	-		P	VU	Rainy

Species	Common name	Beninese red list	Law 93-009 of the July 2 <sup>nd</sup> , 1993	IUCN red list	Season
<i>Rauvolfia vomitoria</i> Afzel.	Poison devil's pepper	NT	P	LC	Rainy, Dry
<i>Rhus natalensis</i>	-			LC	Rainy
<i>Sorindeia grandifolia</i>	-			LC	Rainy
<i>Spondias mombin</i> L.	Prunier monbin	LC	P	LC	Rainy
<i>Sterculia tragacantha</i>				LC	Dry
<i>Triplochiton scleroxylon</i>	Samba	EN	P	LC	Rainy
<i>Uvaria chamae</i> P. Beauv.	-			LC	Rainy, Dry
<i>Zanthoxylum zanthoxyloides</i>	Fagara jaune	VU	P	LC	Rainy, Dry

(EN) In danger, (VU) Vulnerable, (LC) Least Concern, (NT) Near Threatened

(P) Protected under the national regulation



*Milicia excelsa*



*Zanthoxylum zanthoxyloides*

(Source: Antea, November-December 2019)



*Pouteria alnifolia*



*Ceiba pentadra*

(Source: Antea, July-August 2020)

Figure 69 : Special-status species



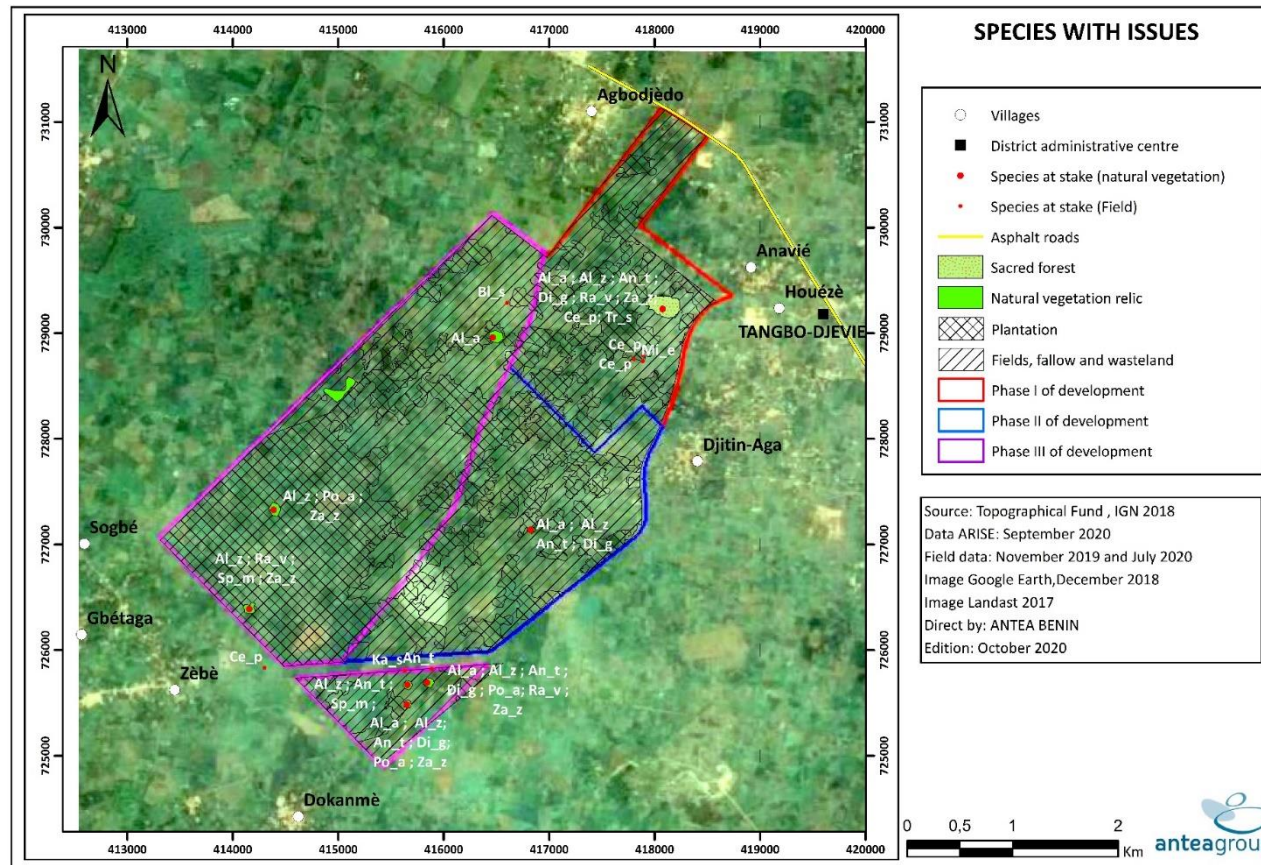


Figure 70 Protected species location in the Project area

Ka\_s : Khaya senegalensis ; Al\_a : Albizia adianthifolia ; Al\_z : Albizia zygia ; An\_t : Antiaris toxicaria ; Bl\_s : Blighia sapida ; Ce\_p : Ceiba pentadra ; Di\_g : Dialium guineense ; Mi\_e : Milicia excelsa ; Po\_a : Pouteria alnifolia ; Ra\_v : Rauvolfia vomitoria ; Sp\_m : Spondias mombin ; Tr\_s : Triplochiton scleroxylon ; Za\_z : Zanthoxylum zanthoxyloides

### 6.4.3. Fauna

The species sought concern all types of fauna that can be observed directly or indirectly (tracks, nests, droppings, etc.) whether mammals, reptiles, birds, butterflies and insects or amphibians. Given the type of Project and the environment in which it takes place, this approach focuses on mammals, reptiles, insects and avifauna, which remain the most visible. Certain species of the insect taxon that are particularly discreet would require specific techniques (prospecting of sites or micro-habitats, insecticide thermonebulisation) to be observed. Thus, in addition to direct observations in the field, information was collected from local populations (individual interviews with the populations encountered in the fields, focus group by the sociologist team) and also in documentation (Ze and Tori-Bossito Communal Development Plan).

#### 6.4.3.1. Birds

##### 6.4.3.1.1. Species recorded

The different investigations led to observed 60 species of birds, for 1,646 individuals registered. Regarding the Project area, this appears relatively low. The recorded species are the following:

Table 32 Registered species of birds

Order / species	Number of individuals registered
<b>Accipitriformes</b>	<b>15</b>
<i>Accipiter badius</i>	1
<i>Elanus caeruleus</i>	1
<i>Kaupifalco monogrammicus</i>	9
<i>Polyboroides typus</i>	4
<b>Apodiformes</b>	<b>8</b>
<i>Cypsiurus parvus</i>	4
<i>Telacanthura ussheri</i>	4
<b>Bucerotiformes</b>	<b>5</b>
<i>Lophoceros nasutus</i>	2
<i>Phoeniculus purpureus</i>	3
<b>Caprimulgiformes</b>	<b>13</b>
<i>Caprimulgus climacurus</i>	13
<b>Charadriiformes</b>	<b>40</b>
<i>Vanellus lugubris</i>	40
<b>Columbiformes</b>	<b>265</b>
<i>Streptopelia semitorquata</i>	86
<i>Streptopelia senegalensis</i>	48
<i>Treron calvus</i>	2
<i>Turtur afer</i>	127
<i>Turtur tympanistris</i>	2
<b>Coraciiformes</b>	<b>4</b>
<i>Ceyx pictus</i>	3
<i>Halcyon leucocephala</i>	1
<b>Cuculiformes</b>	<b>166</b>



Order / species	Number of individuals registered
<i>Centropus senegalensis</i>	139
<i>Ceuthmochares aereus</i>	6
<i>Chrysococcyx caprius</i>	19
<i>Chrysococcyx klaas</i>	2
<b>Falconiformes</b>	<b>6</b>
<i>Falco cuvierii</i>	2
<i>Falco tinnunculus</i>	4
<b>Galliformes</b>	<b>70</b>
<i>Pternistis bicalcaratus</i>	70
<b>Musophagiformes</b>	<b>7</b>
<i>Crinifer piscator</i>	7
<b>Passeriformes</b>	<b>1023</b>
<i>Amblyospiza albifrons</i>	2
<i>Camaroptera brachyura</i>	88
<i>Cecropis abyssinica</i>	7
<i>Cinnyris chloropygius</i>	58
<i>Cinnyris coccinigastrus</i>	19
<i>Cinnyris cupreus</i>	8
<i>Cinnyris superbus</i>	1
<i>Cinnyris venustus</i>	2
<i>Corvinella corvina</i>	65
<i>Dicrurus adsimilis</i>	1
<i>Estrilda melpoda</i>	31
<i>Euplectes franciscanus</i>	2
<i>Hirundo aethiopica</i>	31
<i>Lanius collaris</i>	16
<i>Malaconotus blanchoti</i>	6
<i>Malimbus rubricollis</i>	2
<i>Passer griseus</i>	4
<i>Ploceus cucullatus</i>	420
<i>Ploceus nigerrimus</i>	20
<i>Ploceus nigricollis</i>	14
<i>Prinia subflava</i>	7
<i>Prionops plumatus</i>	4
<i>Pycnonotus barbatus</i>	146
<i>Spermestes bicolor</i>	9
<i>Spermestes cucullatus</i>	15
<i>Sylvietta virens</i>	1
<i>Turdus pelios</i>	41
<i>Vidua macroura</i>	3
<b>Pelecaniformes</b>	<b>7</b>
<i>Bubulcus ibis</i>	7
<b>Piciformes</b>	<b>2</b>

Order / species	Number of individuals registered
<i>Pogoniulus bilineatus</i>	2
<b>Psittaciformes</b>	<b>3</b>
<i>Psittacula krameri</i>	3
<b>Strigiformes</b>	<b>12</b>
<i>Otus senegalensis</i>	2
<i>Ptilopsis leucotis</i>	6
<i>Scotopelia peli</i>	2
<i>Tyto alba</i>	2
<b>TOTAL</b>	<b>1,646</b>

The Passeriformes order are the most representatives order on site with more than 1,000 registered individuals. All the species observed are sedentary. No migratory species have been encountered, but as the period of the study does not coincide with the arrival of migratory species (from mid-September), none was observed while their presence remain possible.

These results show that the majority of species observed on the site are common species (i.e. species that are often encountered in studies of avian fauna in Benin).

Most of them are generally found in degraded or anthropized environments (fields, plantations, urban areas) and do not present conservation issues. Some species of forest environments are observed thanks to the presence of forest island and fallow land. This is the case of the Superb Sunbird (*Cinnyris superbus*), the tambourine Dove (*Turtur tympanistria*).

One species which is wetlands-dependent is observed on the site. This is the Dull Lapwing (*Vanellus lugubris*) which also frequents open areas (meadow, open fields) especially during the wet period of the year.

Four species of nocturnal raptor were identified during the nocturnal observations:

- White-faced Screech Owl (*Ptilopsis leucotis*) is a common species that frequents wooded areas and forest edges. It also lives in forest areas bordering rivers. It is generally nocturnal. It feeds on insects, small reptiles, small rodents, birds.
- African Screech Owl (*Otus senegalensis*) is a common species that frequents wooded areas at the edge of forests. It feeds on small rodents and birds. It is usually nocturnal.
- Barn Owl (*Tyto alba*) is a common species that frequents various environments and found shelters especially in human housing. It is nocturnal. It feeds on lizards, rodents and birds.
- Pel fishing owl (*Scotopelia peli*) is a rare species of raptor that inhabits forests bordering water. It is usually nocturnal and can also be seen during the day. It feeds on frogs and fish. Night-time observations were made around the sacred forest islet of Anavie within which there is a temporary backwater.



*Prinia subflava*



*Vidua macroura*



*Cinnerys chloropygius*



*Prionops plumatus*

Figure 71 Birds species observed on site

#### 6.4.3.1.2. Bird nesting

Indices of reproduction and observation of nesting activity were observed in the field. The nesting of some species is confirmed by direct observation of nesting evidence such as the transport of strands for building nests, nuptial plucking in others, occupied nests, egg laying and brooding. The Double-spurred Francolin (*Pternistis bicalcaratus*) is a common species observed 2 times for laying and incubating eggs on 2 different transects.



(Source: Antea, July 2020)

Figure 23 Double-spurred Francolin nest with 6 eggs

The bird species whose nesting on the site is confirmed are as follow:

**Table 33 Bird species nesting on site**

Order	Family	Species	Common name	Nesting evidence
Galliformes	Phasianidae	<i>Pternistis bicalcaratus</i>	Double-spurred Francolin	Laying and brooding
Passeriformes	Ploceidae	<i>Ploceus cucullatus</i>	Village weaver bird	Occupied nests
Passeriformes	Estrildidae	<i>Estrilda melpoda</i>	Orange-cheeked waxbill	Transport of vegetation strands
Columbiformes	Columbidae	<i>Streptopelia semitorquata</i>	Red-eyed dove	Transport of vegetation strands
Cuculiformes	Cuculidae	<i>Chrysococcyx klaas</i>	Claas's Cuckoo	Laying
Cuculiformes	Cuculidae	<i>Chrysococcyx caprius</i>	Diederik cuckoo	Laying
Passeriformes	Estrildidae	<i>Spermestes cucullatus</i>	Bronze mannikin	Transport of vegetation strands
Passeriformes	Ploceidae	<i>Ploceus nigerrimus</i>	Vieillot's black weaver	Occupied nests
Passeriformes	Ploceidae	<i>Amblyospiza albifrons</i>	Thick-billed weaver	Breeding plumage
Passeriformes	Viduidae	<i>Vidua macroura</i>	Pin-tailed Whydah	Courtship ritual
Passeriformes	Ploceidae	<i>Euplectes franciscanus</i>	Orange Bishop	Breeding plumage

Among these species, only the Double-spurred Francolin is known to be a ground-nesting bird. Others nest in trees or shrubs.

#### 6.4.3.1.3. Bird species requiring special attention

No species recorded are endemic to the Project site area. The few species which are subject to protection and requiring special attention are summarized in the table below. According to the IUCN Red List all species inventoried at the site are of Least Concern.

**Table 34 Bird species requiring special attention**

Species	Common name	National regulation	Beninese red list	IUCN red list
<i>Psittacula krameri</i>	Rose-ringed parakeet	B	NT	LC
<i>Scotopelia peli</i>	Pel's fishing owl	A	VU	LC

(VU) Vulnerable, (LC) Least Concern, (NT) Near Threatened  
(A) Entirely protected; (B) partially protected

#### 6.4.3.2. Mammals

##### 6.4.3.2.1. Species recorded

The intensification of land use for human activities comes a conversion of natural environments into anthropized environments (urban and agricultural). This explains the low richness of the Project area in large mammals.

The mammal species that have been identified include small ones as rodents and lagomorphs. Some of these species were observed directly during the investigations, with the camera, others indirectly through the presence of their footprints and/or burrows and through the statements of local hunter.

Table 35 Species observed with the camera

Species	Common name	Family	Degree of presence <sup>6</sup>
<i>Euxerus erythropus</i>	Striped ground squirrel	Sciuridae	2
<i>Philantomba walteri</i>	Duiker	Bovidae	0,75
<i>Tragelaphus scriptus</i>	Harnessed bushbuck	Bovidae	0,5
<i>Chlorocebus aethiops tantalus</i>	Tantulus monkey	Cercopithecidae	0,5
<i>Cricetomys gambianus</i>	Gambian Rat	Cricetomynae	2
<i>Genetta tigrina</i>	Cape genet	Viverridae	8

The Tantalus monkey, the duiker and the harnessed bushbuck were observed in the sacred forest.

In addition to species observed through the camera, others have been captured by the non-injurious traps. These include the Greater cane rat (*Thryonomys swinderianus*), the gambian rat (*Cricetomys gambianus*) and the Striped ground squirrel (*Euxerus erythropus*). The low level of capture could be explained by the strong anthropogenic pressure on these species. Indeed, they are the main targets for trap and rifle hunting in the Project area. This makes them very suspicious of foreign objects in their environment.

Interviews with local hunters confirm the presence of theses species. They mentioned also the hare (*Lepus saxatilis*).



Greater cane rat



Gambian rat

<sup>6</sup> This degree of presence is the ratio of the number of images of the species by the number of cameras installed in a given habitat





Squirrel



Released squirrel

(Source : Antea, July-August 2020)

Figure 72 Captured fauna with the non-injurious traps

#### 6.4.3.2.2. Mammal species requiring special attention

No species recorded are endemic to the project site area. The few species which are subject to protection and requiring special attention are summarized in the table below. According to the IUCN Red List all species inventoried at the site are of Least Concern.

Table 36 Mammal species requiring special attention

Species	Common name	National regulation	Beninese red list	IUCN red list
<i>Tragelaphus scriptus</i>	Harnessed bushbuck	B	NT	LC
<i>Philantomba walteri</i>	Duiker	A	NT	DD
<i>Genetta tigrina</i>	Cape genet	A	NT	LC
<i>Chlorocebus aethiops tantalus</i>	Tantulus monkey	B	LC	LC

(LC) Least Concern, (NT) Near Threatened; (DD) Data deficient

(A) Entirely protected; (B) partially protected

- ***Tragelaphus scriptus* - Harnessed bushbuck**

It is an antelope that can be seen from north to south of the country. It inhabits forests gallery, open forests, edges and clearings in dense forests, plantations and village neighbourhoods. It consumes leaves, flowers and fresh herbs of different species. Its international threat category (IUCN) is LC. With reference to Law No. 2002-16 of October 18, 2004 on the regime of wildlife in the Republic of Benin and decree No. 2011 - 394 of May 28, 2011 establishing the terms of conservation, development and sustainable management of wildlife and its habitats in the Republic of Benin, the harnessed bushbuck is classified in annex II as partially protected.



Figure 73 Harnessed guibs in the sacred forest

- ***Philantomba walteri* - Duiker**

It is a mammal found in West Africa, especially Togo, Benin and Nigeria. This species likes dense and humid formations, forest galleries, forest islands and forest-savannah mosaics. It is an herbivore that mainly consumes leaves but also grasses.

In Benin these habitats are nowadays largely destroyed but the species is well suited to the few relic formations existing in spaces exploited by humans. The species is found across the country and is the only duiker species in the extreme south of the country.

At the IUCN level, the Duiker does not belong to a threat category because there is a significant lack of data on the species.



Figure 74 Duiker in the sacred forest

- ***Genetta tigrine* - Cape genet**

It is a carnivorous mammal that lives in dense dry forests and is also found in plantations. Classified in annex I by Law No. 2002-16 of October 18, 2004 on the Fauna regime in the Republic of Benin and Decree No. 2011 - 394 of May 28, 2011 setting out the modalities of conservation, development and sustainable management of fauna and its habitats in the Republic of Benin, the genet is fully protected in Benin. According to the IUCN classification, the genet is of minor concern (LC status).



Figure 75 Cape genet in acacia plantation

- ***Chlorocebus aethiops tantalus* - Tantalus monkey**

It can be seen almost all over the country and is threat. It lives in dense dry forests and feeds on fruits, insects, leaves and sometimes eggs and birds. Considered harmful because of its harvesting in the fields adjoining its habitat, it is highly hunted by farmers (Benin red list p.242). On site, the monkeys are causing more and more enormous damage in the fields (maize, cowpea, cassava etc.) because of the decrease of their living space.

The tantulum monkey is of minor concern at the level of the IUCN as well as Benin and is classified in annex II by Law N ° 2002-16 of October 18, 2004 relating to the Fauna regime in the Republic of Benin and decree N ° 2011 - 394 of May 28, 2011 setting the terms of conservation, development and sustainable management of wildlife and its habitats in the Republic of Benin.





Figure 76 Tantalus monkey in the forest area

#### 6.4.3.3. Reptiles and amphibians

During the investigations, margouillates (*Agama spp.*) were directly observed. Nevertheless, information collected from local residents and more particularly from hunters revealed that the Project area is also teeming with other reptiles such as pythons (*Python sebae*), vipers (*Bitis arietans*) and spitting cobras (*Hemachatus haemachatus*).

Only the python falls under the protection of the national regulation.

Table 37 Reptile species requiring special attention

Species	Common name	National regulation	Beninese red list	IUCN red list
<i>Python sebae</i>	Python	A	-	-

(A) Entirely protected

Unnoticed throughout the investigation, the amphibians are, according to local residents, very present in the Project area. They are discovered during field work, where they are found lurking in the grasses or in the soil. Of the 51 species of amphibians identified in Benin (Nago and al., 2010), only 2 are said to be present on the site according to local residents. These are the rocket frog (*Ptychocheilichthys oxyrhynchus*), present in all savannah regions in Africa, (Penner et al, 2010) and the toad (*Bufo pentoni*) which is a species that is very common in fields, villages and towns (Penner and al, 2010).

#### 6.4.3.4. Butterflies and insects

The butterfly families encountered are mainly Pieridae (Catopsilia florella; Eurema brigitta brigitta; Belenois aurata); Nymphalidae (Acraea serena) and Papilioninae (Graphium angolanus).



*Acraea serena*



*Graphium angolans*

(Source: Antea, November-December 2019)

**Figure 77 : Butterflies seen on the site**

The insects present in the Project area are mainly: *Gryllus bimaculatus* (Gryllidae); *Polistes fastidiosus* (Vespidae); *Necrobia rufipes* (Cleridae); *Crocothemis erythraea* (Libellulidae).



*Polistes fastidiosus*



*Crocothemis erythraea*

(Source: Antea, November-December 2019)

**Figure 78 : Insects seen on the site**

#### 6.4.3.5. Fish

The presence of fish in the Project area is conditional on the presence of watercourses or fish farms. Site visits revealed that no potential fish habitat streams or fish farms were present at the site during investigations (November - December 2019 and July-August 2020).



## **6.5. Human environment**

### **6.5.1. Governance**

#### **6.5.1.1. Project administrative setting**

The Project is located in the Atlantic Department, astride 2 municipalities: Tori-Bossito and Ze. It is more precisely set on the territory of 2 districts: Tori-Cada district in Tori-Bossito municipality, and Tangbo-Djevie district in Ze municipality.

As explained previously, the Project is surrounded by 8 villages:

- Dokanme, Gbetaga, Sogbe and Zebe in that of Tori-Bossito.
- Agbodjedo, Anavie, Djitin-Aga and Houeze in the municipality of Ze.

The map below presents the administrative setting of the Project area.

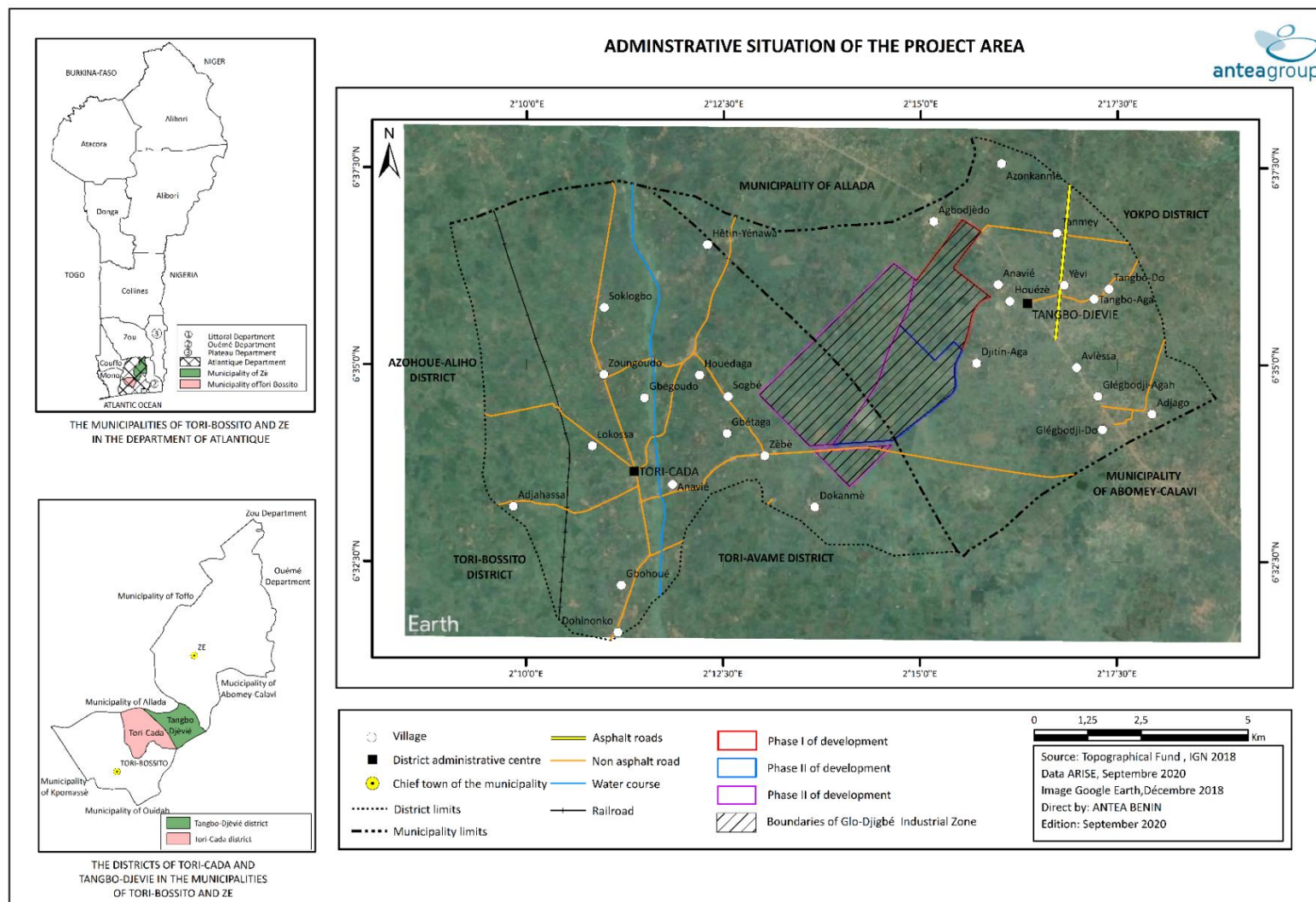


Figure 79 : Administrative situation of the Project area

### 6.5.1.2. Territorial administrative organisation

Benin territorial organisation rests on a pyramidal structure with several layers that are either designated by central government authorities or locally elected.

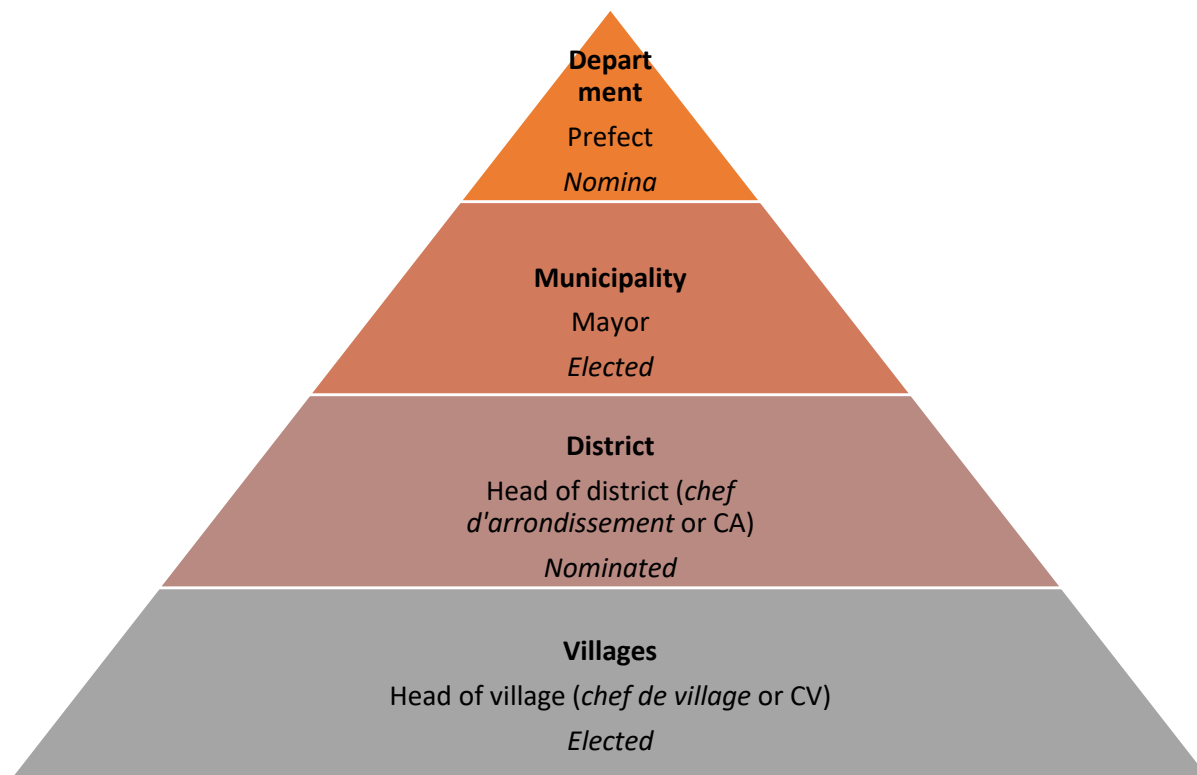


Figure 80 : Territorial organization in Benin

As shown on the figure, departments headed by prefects, encompass several municipalities headed by mayors, which are then divided into districts administered by a district chief called *chef d'arrondissement* (CA). District chiefs are selected by the Municipality Council.

Districts are subdivided into villages or neighbourhoods in urban area. These administrative units are headed by a village or neighbourhood chief who is elected.

Through the law No. 97-028 of 15 January 1999 on the organization of territorial administration in the Republic of Benin, Benin has set in place a process of decentralization, with the aim of strengthening grass-roots democracy and creating efficient conditions for the balanced development of all the country's localities. The fundamental objective and major challenge of decentralization is local development and by extension regional development.

This decentralization has been based on the establishment of municipalities as decentralized authorities. Led by elected mayors, municipalities are at the centre of the local development process and are devolved with financial autonomy and several competencies defined in the law No. 97-029 of 15 January 1999. Among these, the main ones pertinent at the Project level are:

- Land planning: elaboration of development plans, delivery of building permits.
- Road infrastructures: road maintenance and road signs installation.
- Environment and sanitation: provision and distribution of drinking water, collection and treatment of solid and liquid waste, waste water and rainwater discharge, protection against inundations.

- Health and social services: construction, operation and maintenance of health centres, centres for social promotion, cultural and sports infrastructures.

### 6.5.1.3. Prefecture of the Atlantic Department

Located in the south of Benin, the Atlantic Department is bordered to the north by the department of Zou, to the east by the department of Oueme, to the south-east by the department of Littoral, to the south by the Atlantic Ocean and to the west by the department of Mono. The map below shows the location of the Atlantic Department and the Project area.



(Source: Wikipedia)

**Figure 81 : Benin departments with in Project location in red**

The department covers an area of 3,233 km<sup>2</sup> and extends nearly 100 km from the coast to the interior of the country. The department has 8 municipalities, namely Abomey-Calavi, Allada, Kpomasse, Ouidah, Se-Ava, Toffo, Tori-Bossito and Ze. These municipalities are subdivided into 74 districts and 501 villages.

Like all other departments, the Atlantic Department is headed by a prefect. This prefect is appointed in the Council of Ministers, by decree of the President of the Republic, on the proposal of the Minister of the Interior. He is a high-ranking civil servant who reports, for his management, to the Ministry of

the Interior but represents all the ministers in the department. An Administrative Conference is set up around the Prefect, made up of directors and heads of the decentralised State services in the department.

A council called the Departmental Council for Concertation and Coordination is set up at departmental level, composed of the prefect of the department; mayors of municipalities and their deputies; a representative of the Departmental Union of Producers, a representative of the Departmental Consular Chamber; a representative of the Departmental Federation of Parents' Associations.

The Prefecture is organized into departments, whose activities are coordinated by a Secretary General appointed by a decree issued by the Council of Ministers on the proposal of the Ministry of Decentralization and Local Governance and exercising its functions under the authority of the Prefect. Among these departments, the most important for the Project are the departments of general affairs and of land planning.

The Prefecture also counts 33 devolved state services among which the most important for the Project are:

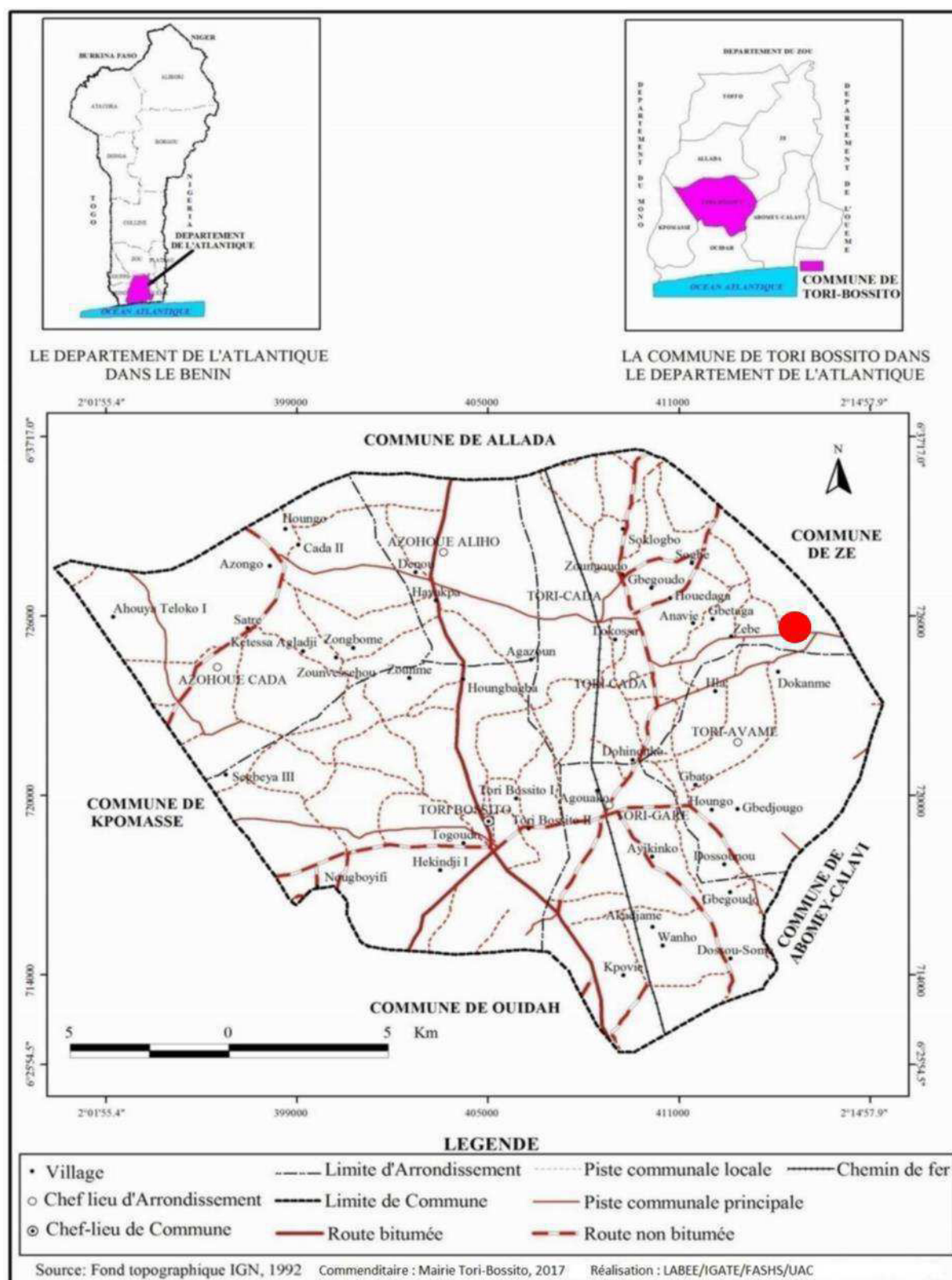
- Departmental Directorate for the Living Environment and Sustainable Development
- Departmental Directorate of Industry and Trade
- Departmental Directorate of Health
- Departmental Directorate for Infrastructure and Transport
- Departmental Directorate of Planning and Development
- Departmental Directorate for culture, leisure and sports

#### **6.5.1.4. Municipality of Tori-Bossito**

The surface area of the municipality of Tori-Bossito is 328 km<sup>2</sup>, or 10% of the total area of the Atlantic Department. It is subdivided into 6 districts: Avame, Azohoue-Aliho, Azohoue-Cada, Tori-Bossito, Tori-Cada and Tori-Gare; which cover 58 villages and city districts.

The map below shows the boundaries of the municipality and the approximate Project location (red dot).





(Source: PDC of Tori-Bossito, 2018)

**Figure 82 : Tori-Bossito municipality boundaries**

The current Municipality Council has 13 members including the Mayor and his 2 deputies who were elected in 2015.

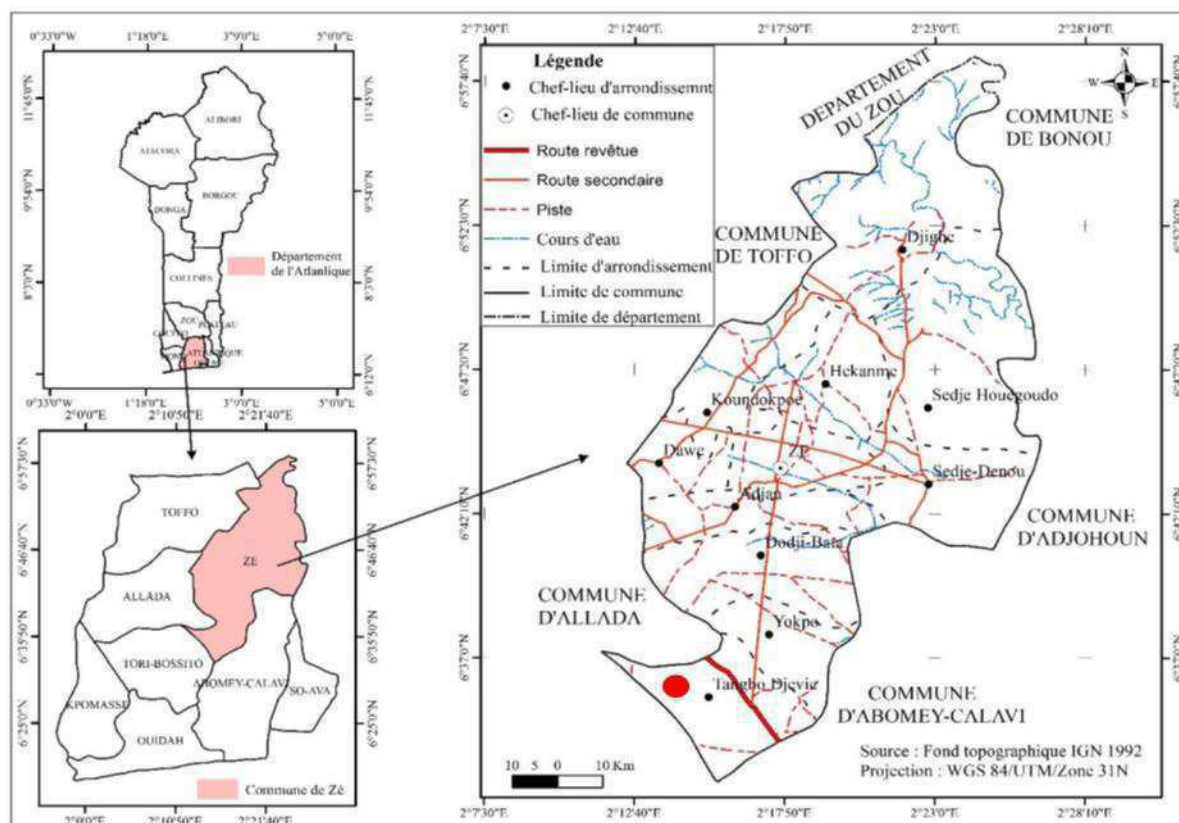
The main services available at the Tori-Bossito municipality in relation to the Project are:

- Local development and planning service.
- Water service.
- Land and environment affairs service.
- Other services that were planned to be deployed are not yet operational due to a lack of space, financial resources and qualified personnel.

#### 6.5.1.5. Municipality of Ze

The municipality of Ze covers an area of 653 km<sup>2</sup>, *i.e.* 19.88% of the department's surface area. It is subdivided into 11 districts, namely: Adjan, Dawe, Djigbe, Dodji-Bata, Hekanme, Koundokpoe, Sedje-Denou, Sedje-Houegoudo, Tangbo-Djevie, Yokpo, Ze.

The map below shows the boundaries of the municipality and the approximate Project location (red dot).



(Source: PDC of Ze, 2019)

Figure 83 : Ze municipality boundaries

According to the General Population and Housing Census No. 4 (RGPH 4), the municipality has 101 villages.

The municipality of Ze is administered by an elected Municipality Council, which has been in place since 2015 for a five-year term. It is composed of 17 elected councillors including one woman who is currently the head of the Dodji Bata district. The Mayor of the municipality is assisted by 2 deputies.

The Municipality Council has set up permanent committees whose mission is to study any issue falling within their areas of competence. The standing committee exercises this function at the request of the

Mayor and the Municipality Council. In the municipality of Ze, not all standing committees are functional due to lack of knowledge of their role, lack of resources allocated for their functioning and lack of motivation of their members.

Among the 12 services existing at the municipality, the main services in relation to the Project are:

- Local development and planning service.
- Water service.
- Land and environment affairs service.
- Social affairs and decentralisation service.
- Economic affairs service.

#### **6.5.1.6. Customary organization**

##### **6.5.1.6.1. Historical foundation**

The villages of the study area historically inhabited by the Aizo and Tori communities.

These villages each have their own history and each history structures the organization of their social environment. The data collected during the field survey show that each of these communities has been established in these areas since pre-colonial times and originates from a same location, the kingdom of "Adja-Tado"<sup>7</sup>, which is at the centre of the founding history of the kingdoms of Allada, Abomey and Porto-Novo<sup>8</sup>. Indeed, foundation stories as told by elders in these villages revealed that:

- Zebe foundation dates to the Abomey kingdom (17<sup>th</sup> to 20<sup>th</sup> century). When the kingdom wanted to forcibly recruit workers (most probably slaves) from the Tori area, the village ancestor fled and hide in the forest where he later founded Zebe village which means "turn and hide".
- Agbodjedo means "the heart and breath calm down" because the founding ancestor, from Porto-Novo, fled the Adja-Tado war and settled in the area where he could rest and stopped being afraid of the war.
- Gbetaga and Dokanme foundation dates to the same period, and both villages were created following a conflict between 2 brothers leading one of them to settle his new village in a new location.

Based on these stories, it turns out that driven out of their homeland by the war, the ancestors of these populations found refuge in these environments that have become their village. Village boundaries are nowadays mostly known by elders and sometimes marked by hyssop bushes or "Agnan" trees.

Three villages have suffered from a loss of territory because of the Glo-Djigbe airport Project: Dokanme, Anavie and Djitin-Aga.

Villages have good relationships with each another and there are only occasional territorial conflicts when village limits overlap, but these are solved rapidly by village elders.

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<sup>7</sup> Adja-Tado refers to a place named Tado, located on the Aja plateau along the Mono River, nowadays in Togo. At the centre of a former kingdom, the Tado Kingdom of Adja people, Tado is the place from where descendants of the king emigrated to other areas after a war broke out in the kingdom, following the Mono and Coffo Rivers to settle in the southern area of Benin and in particular in Allada.

<sup>8</sup> These kingdoms have been formed from the 16<sup>th</sup> to the 18<sup>th</sup> century by brothers originating from the Adja-Tado area.

#### 6.5.1.6.2. Decision-making process

Each founding ancestor of the Aizo community, in his position as head of the community, instituted and implemented a customary organization based on the extended family and the clan. Each family (*Hin-nou*) has a chief (*Dah*) who is obeyed by the members of that family. Clans play a role in the village life through intermediation and moderation of social relationships and are guardians of the traditions.

Beyond the family and clan, village social organization relies on other important stakeholders. The main one is the head of village, usually a customary chief that must be elected by the village members. Each head of village is supported by a consultative council. The head of village is assisted in his functions by customary authorities such as elders, businessman or wealthy individuals, dignitaries as well as religious or cult leaders.

The proliferation of traditional religions and the domination of the Voodoo cult has indeed led successive head of villages to consecrate kings of deities as heads of worship or cult leaders. Therefore, religious authorities have become influential in the political affairs of the villages.

All these stakeholders participate to the decision-making process at the village-level. They work harmoniously with other administrative structures such as the heads of districts, mayors and prefects.

Women do not participate in customary decision-making, apart from older women which might be consulted. Women only participate in taking decisions when they are directly concerned by these decisions.

Young persons are also reported as participating in the decision process although their form of participation has not been determined.

#### 6.5.1.6.3. Conflict-resolution

Conflict sources are often related to land issues, marital relationships (adulteries, disagreement in a couple), disputes caused by alcohol consumption and brawls or petty crimes (theft of cattle for instance). In one village, drug consumption is the cause of several social troubles (violence and rapes). Some of these problems have appeared recently on the start of the expropriation process for the Glo-Djigbe airport.

Conflict resolution is entrusted to the village authorities who apply mediation to solve conflicts. There are special conflict management strategies for women-related conflicts.

When the conflicts cannot be solved locally, they are referred to the police station in the district or claimants are urged to seek judicial resolution.

### 6.5.2. Land resources

#### 6.5.2.1. Local land management

##### 6.5.2.1.1. Land access

The mode of access to land in the study area used to be largely customary, based on donation or inheritance. With the changes in land management that occurred over the last 20 years, there are now several types of access, the most important of which are: inheritance, purchase, pledge, rental, loan and sharecropping. Donation has become very rare.

In general, land purchased is titled by its owner while customary land is not titled. In all villages, it is reported that customary land remains, to date, largely untitled.

While land was usually acquired by inheritance or donation, the strong agro-land pressure and the hoarding of agricultural land by city dwellers tends to generalise purchase as the preferred method of access to land in the 2 districts of the study area.

#### 6.5.2.1.2. Land pressure and speculation

Both Tori-Bossito and Ze are located within the influence sphere of the Cotonou perirurbanisation. This led to what was documented as early as 2013 as a "land rush" and to the emergence of a largely informal land market.

There has indeed been a strong acquisition of agricultural land by various types of buyers with different motivations. This rush is due to multiple factors among which:

- The extension of Cotonou urbanisation which lead farmers from Ouidah and other southern towns to move up north in the look for farmland.
- The arrival from northern migrants also looking for land or willing to settle close to Cotonou for work.
- The construction of the future Glo-Djigbe airport which attracts urban investors wishing to profit from the expected property development in the surrounding of this Project. These investors usually buy large swaths of land, plant them with fruit trees and register them officially, and then wait several years before dividing them into smaller building plots when the prices reach their highest.
- The expropriation process of the airport which lead many land owners to use their compensation to buy land on the Project site.
- The settlement of individuals working in Cotonou who perform daily pendulum movements.

While many buyers have intervened individually, developers have also invested in the area. They have carried out operations to divide up and sell plots of land located near the future airport (and therefore, for some of them, in the Project area) to urban buyers who wanted to invest with a view to the economic development of the area.

Land sales have become an important source of incomes for local villages. The reasons for the sale of land are the purchase of motorcycles, the organization of funeral ceremonies and the payment of the dowry to the women, among others. This pushes most local farmers to resort to land rentals in order to produce. This is especially noticeable among pineapple producers.

The land speculation in the study area has deeply transformed land management practices. Thus, "the current market pressure is leading to a significant reduction in the land heritage of the indigenous lineages, with strong consequences in terms of competition and land insecurity" (Magnon, 2013). Land sales have progressively deprived local villagers from their productive asset leading to an increase in land insecurity and a vulnerability to land grabbing or land deprivation. Villagers also complain from a lack of land resources caused by the expropriation process to make way for the Glo-Djigbe airport.

#### 6.5.2.1.3. Land prices

Land prices have steadily increased in the area due to the speculative phenomenon. Depending on the type and location of the land (against the road network, close to the future airport, etc.), land prices can vary strongly. Land plots with land titles are more expensive.

The table below, which is a collection of land prices from villages in the study area, underlines this strong price increase.



Table 30 Various land prices reported in the villages of the study area

District	Village	Land price reported	Type of land	Price per m <sup>2</sup>
Tori-Cada	Dokanme	750,000 FCFA for 500 m <sup>2</sup>	-	1,500 FCFA/m <sup>2</sup>
	Gbetaga	1,300,000 FCFA for 500 m <sup>2</sup>	Building plot	2,600 FCFA/m <sup>2</sup>
		5 to 10,000 000 FCFA for one ha	Farm land	500 to 1,000 FCFA/m <sup>2</sup>
	Sogbe	650,000 for 500 m <sup>2</sup>	Building plot	1,300 FCFA/m <sup>2</sup>
		6,000,000 FCFA for one ha	Farm land	600 FCFA/m <sup>2</sup>
	Zebe	8,000,000 FCFA for 500 m <sup>2</sup>	-	16,000 FCFA/m <sup>2</sup>
Tangbo-Djevie	Agbodjedo	5 to 7,000 000 for 500 m <sup>2</sup>	Building plot	10,000 to 14,000 FCFA/m <sup>2</sup>
		5 to 7,000 000 for one ha	Farm land	500 to 700 FCFA/m <sup>2</sup>
	Anavie	2 to 7,000,000 FCFA for 500 m <sup>2</sup>	Building plot	4,000 to 14,000 FCFA/m <sup>2</sup>
		10 to 50,000,000 for one ha	Farm land	1,000 to 5,000 FCFA/m <sup>2</sup>
	Djitin-Aga	2 to 3,000,000 FCFA for 500 m <sup>2</sup>	Building plot	4,000 to 6,000 FCFA/m <sup>2</sup>
		15 to 30,000,000 FCFA for one ha	Farm land	1,500 to 3,000 FCFA/m <sup>2</sup>
	Houeze	3 to 7,000,000 FCFA for 500 m <sup>2</sup>	Building plot	6,000 to 14,000 FCFA/m <sup>2</sup>
		10 to 30,000,000 FCFA for one ha	Farm land	1,000 to 3,000 FCFA/m <sup>2</sup>

(Source: ANTEA, November 2019 and August 2020)

Based on the data provided in this table, the average price for each type of land is as follow:

- **Building plot:** minimum 1,300 FCFA/m<sup>2</sup> - **average 7,590 FCFA/m<sup>2</sup>** - maximum 14,000 FCFA/m<sup>2</sup>.
- **Farm land:** minimum 500 FCFA/m<sup>2</sup> - **average 1,600 FCFA/m<sup>2</sup>** - maximum 5,000 FCFA/m<sup>2</sup>.

The Tori-Bossito PDC also gives an overview of these speculative prices with some assets selling at 2,000,000 FCFA for 500m<sup>2</sup> (4,000 FCFA/m<sup>2</sup>).

Prices of land remains much higher in the Tangbo-Djevie villages, which is explained by their immediate proximity with the interstate national road 2 (RNIE 2) and the future airport whereas Tori-Cada villages are more landlocked.

#### 6.5.2.1.4. Land conflicts

The trend towards increased land sales, which is becoming more widespread among the rural population, has led to an increase in land conflicts.

Thus, several types of land conflicts are recorded in the municipality of Tori-Bossito. They are linked to non-compliance with contractual clauses, property limits, the questioning of sales by the sellers' children, the sale of land to several buyers and the sharing of inheritance. To these must be added conflicts between farmers and herders, which are frequent during the rainy season because of the destruction of fields by animals from the neighbouring hamlets.

These conflicts are usually solved at the village level using customary ways, but some conflicts can lead to judicial battles.

In addition, the municipality is faced with border problems with neighbouring municipalities that would gradually encroach on its territory. It should also be pointed out that, of the 3,028 ha dedicated to the construction of Glo-Djigbe airport, at least 1,122 ha are in the territory of the municipality of Tori-Bossito.

In terms of land resources, Ze is one of the municipalities where land has been identified according to the specific cultural characteristics of the area for agricultural development by the *Coopérative d'Aménagement Rural* and *Union Régionale des Coopératives d'Aménagement Rural* and the *Office National du Bois* (approximately 3,441 ha). Today there is a problem of management and insecurity of this land. This insecurity is accentuated all the more since the town hall has not been involved in the management of these cooperatives. It should also be noted that the occupation of vast estates by the cooperatives has meant that the town hall currently has practically no administrative land reserves. The solution to this problem necessarily involves subdivision. Thus, since 2005, subdivision work has begun and has covered several localities in the municipality.

Local development plans Local development plans Articles 82 to 109 of Act No. 97-029 of 15 January 1999 on the organization of municipalities in the Republic of Benin confer specific powers to the municipality and specify the areas in which it intervenes in conjunction with the State and other communities (cf. § 6.5.1.1).

In order to exercise these powers and improve the environment and living conditions of the population, the Act requires each municipality to have a local planning tool, *i.e.* a communal development plan (PDC), which is drawn up using a well-defined method.

The municipalities of Ze and Tori-Bossito have already completed 2 PDCs and since 2019 have been implementing their third development plans for the period 2019-2023.

The municipality of Ze in its PDC has identified 4 programs to be implemented:

- Program 1: Strengthening local governance.
- Program 2: Improving the productivity of production sectors and food and nutritional security.
- Program 3: Improving the management of the living environment, natural resources, disasters and hazards related to climate change.
- Program 4: Strengthening basic social services.

The municipality of Tori-Bossito has also defined 5 major programs:

- Program 1: Improvement of local governance and promotion of gender.
- Program 2: Promotion of local economy, training and youth employment.
- Program 3: Promotion of socio-cultural and economic well-being and social protection.
- Program 4: Strengthening food, health and nutrition interventions.
- Program 5: Sustainable improvement of people's living environment.

#### 6.5.2.2. Land use plans

In parallel with the PDCs, which set clear development objectives, land use plans were carried out in the study area. The major plans are:

- The municipal development master plan (SDAC) of the municipality of Ze in 2006;
- The Glo-Djigbe airport sector plan. This plan distinguishes several areas:
  - a Deferred Development Zone (DDZ) in which the State wishes to develop future Projects;

- zones to be urbanized (ZU), which correspond to areas where the density of housing will increase and require development;
- future roads and motorways serving the airport.

This scheme was validated in March 2018 at the end of a validation session in the presence of a number of ministerial representatives and the Prefect for the Atlantic, and the town halls of the municipalities of Abomey-Calavi, Allada, Tori-Bossito, So-Ava and Ze, as well as the heads of the districts of Glo-Djigbe, Tori-Cada, Tori-Avame, Tangbo-Djevie, Houedo and So-ava. However, the publication of the sector plan report has not yet occurred.

### 6.5.3. Demographics and settlements

Benin counts 12,864,634 inhabitants as of 2020 (CIA, 2020) with a sex ratio of 0.97 male/female. The country has a youthful age structure with almost 65% of its population under the age of 25. This unbalanced population pyramid is caused by a high fertility rate (most women still have 5.5 children in 2020 against 7 in 1990) and a high population growth rate (3.4% in 2020). Life expectancy in the country reaches 61.4 years.

Poverty and unemployment are drivers for outmigrations from Benin citizens and it is estimated that 40% of the country inhabitants lives abroad especially in the West African region.

The population is primarily located in the south, with the highest concentration of individuals settled in and around the cities on the Atlantic coast. Most of the north remains sparsely populated with higher concentrations of residents in the west.

#### 6.5.3.1. Demographics in the Atlantic Departement

According to the latest General Census of Population and Housing (RGPH 4) of 2013, the population of the Atlantic Department is relatively young and is estimated at 1,398,229 with 686,747 males and 711,482 females.

The municipalities of Tori-Bossito and Ze have a population of 57,632 and 106,913 inhabitants, respectively. The following table shows the population of all the municipalities in the Atlantic Department.

Table 31 Demographics of the Atlantic Department

N°	Municipalities	Total population	Male	Female
1	ABOMEY-CALAVI	1,398,229	686,747	711,482
2	ALLADA	127,512	62,148	65,364
3	KPOMASSE	67,648	33,353	34,295
4	OUIDAH	162,034	78,596	83,438
5	SO-AVA	118,547	60,020	58,527
6	TOFFO	101,585	49,068	52,517
7	<b>TORI-BOSSITO</b>	<b>57,632</b>	<b>28,284</b>	<b>29,348</b>
8	<b>ZE</b>	<b>106,913</b>	<b>51,704</b>	<b>55,209</b>
	<b>TOTAL</b>	<b>1,398,229</b>	<b>686,747</b>	<b>711,482</b>

(Source: RGPH 4, 2013)

Analysis of this table shows that the population of Tori-Bossito is 28,284 males and 29,348 females, giving a total of 57,632 inhabitants. The municipality of Ze, which is much more populated, has 51,704 men and 55,209 women, for a total of 106,913.

### 6.5.3.2. Census of the population in the study area

At the level of the study area and its 8 villages, the available population statistics are presented in the table below.

Table 32 Demographics of villages in the study area

Villages	Households	Population	Men	Women	0-14 years old	>60 years old	Youth population (18 years and over)	15-59 years old
<b>District of Tori-Cada</b>								
Zebe	308	1,605	818	787	1461	76	722	729
Gbetaga	236	1,265	599	666	1201	52	552	572
Dokanme	125	630	306	324	565	25	299	305
Sogbe	279	2,091	1,015	1,076	2,007	112	902	900
<b>SUB-TOTAL</b>	<b>948</b>	<b>5,591</b>	<b>2,738</b>	<b>2,066</b>	<b>5,234</b>	<b>265</b>	<b>2,475</b>	<b>2,506</b>
<b>District of Tangbo-Djevie</b>								
Agbodjedo	271	1,716	830	886	1,431	75	825	863
Anavie	140	809	385	424	680	41	370	387
Houeze	188	1,023	503	520	945	32	454	477
Djitin-Aga	-	1,500	700	800	180	10	-	-
<b>SUB-TOTAL</b>	<b>411</b>	<b>5,048</b>	<b>2,418</b>	<b>2,630</b>	<b>3,236</b>	<b>158</b>	<b>1,649</b>	<b>1,727</b>
<b>TOTAL</b>	<b>1,359</b>	<b>10,639</b>	<b>3,118</b>	<b>4,696</b>	<b>8,470</b>	<b>423</b>	<b>4,124</b>	<b>4,233</b>

(Source: INSAE, RGPH4-2013)

In the municipality of Tori-Bossito, the villages of Zebe, Dokanme, Gbetaga and Sogbe have 5,591 inhabitants and 948 households.

In Ze municipality, the villages of Houeze, Agbodjedo, Anavie and Djitin-Aga have 5,048 inhabitants and 411 households (excluding Djitin-Aga).

In all the villages, women are more numerous than men.

In total, the estimated population of the study area is 10,639 persons and 1,359 households according to RGPH 4. The RGPH 4 dates from 2013 and given Benin's demographic growth estimated at +3.4% per year by CIA factsheet on Benin, this population is expected to represent around 12,000 persons in 2020.

The size of households would be 4 to 5 members according to data from the Monograph of the municipality of Tori-Bossito.

### 6.5.3.3. Vulnerable populations

#### 6.5.3.3.1. Identification of vulnerable groups

The concept of vulnerability may be approached from different angles depending on the context. In the case of GDIZ Project, vulnerability refers to the difficulties that some persons or groups may experience in:

- adapting to changes brought about by the Project (for instance due to expropriation);
- taking full advantage of the benefits of the Project (such as the jobs offered);

- regaining living conditions and/or standard of living equivalent to or higher than those that existed before the Project.

The main groups that have been identified are listed below. Their identification has been done thanks to data contained in the PDC of Ze and Tori-Bossito and also from an interview with the personnel of the Centres for Social Promotion of Tori-Bossito and Ze municipalities.

- Persons with physical or mental disabilities** (PWDs) such as cerebral palsy, amputees, paralysed persons, amblyopic persons, blind persons, hearing-impaired persons, deaf persons, mute persons, persons with Down's syndrome, mentally ill persons, mentally retarded persons.
- Children under 14 years of age**, who are not in school or who have dropped out of school. These children are exposed to trafficking and economic exploitation through underage work. This is the case of child slaves also called "*vidomegons*" or "placed children" in English. These are children from poor families, placed in well-off families in order to benefit from an education in exchange for domestic chores, but who are often out of school and work in conditions close to slavery.
- Orphans**: according to Ze local development plans, there is an important number of orphans in the municipality who live in complete deprivation.
- Elderly**: Ze PDC underlines that elderly are also among the vulnerable groups because they are often abandoned by their relatives, becoming undernourished and living in squalid conditions. Elders suffer from a weakening of family bonds which indicates strong changes in traditional community cohesion. Elders are indeed usually cared for by their children and other relatives but those increasingly decide to stop the care for financial reasons, and resort to accuse the elder of sorcery to justify the abandonment.
- Women-headed households and widows**: young mothers are particularly exposed, suffering from abandonment from their spouse because of unemployment, alcoholism and domestic violence. Widows also suffer from a grabbing of their goods by their husband's relatives, as underlined in section 6.5.3.
- Very poor households**: these households do not have enough financial resources, which often lead them to deschool their children, especially young girls which are forced to enter marriage rapidly so that they cease to be a financial burden to their parents.

There are no displaced persons or refugees in the study area. There are ethnic minorities in the villages such as Fulanis, but they do not suffer from discrimination although their presence can generate tensions because their cattle often feed on farmers' crops.

The CSP of Ze was not able to provide exact figures on the number of vulnerable persons in the municipality. In Tori-Bossito CSP, data exists based on centre attendance and shows that there are:

- 632 persons handicapped physically or mentally, among which 297 women.
- 109 orphans and street kids.

Both CSP witnessed an increase in the vulnerable populations over the last 10 years, which they blame on lack of employment causing a lack of financial resources, sorcery and household abandonment.

Vulnerable groups, especially PWDs, suffer from numerous discriminations.

PWDs are a specific group that is indispensable when discussing the issue of equitable development. Unfortunately, some families continue to consider them as a social disgrace and to hide them. The construction of socio-educational infrastructures does not take their physical conditions into account.



This makes it difficult for them to have access to basic services. Their situation makes it necessary to define integrated strategies for caring for this segment of the population.

When interviewed, PWDs underlined that their only income source is derived from land and farming activities, as they cannot engage in other activities. PWDs rent or own land and are therefore very vulnerable to land expropriation because they would hardly find alternative sources of incomes.

The table below presents an approximate number of PWDs in each village of the study area.

**Table 33 Approximate number of PWDs in the study area**

Village	Number of PWDs
Gbetaga	10
Dokanme	7
Sogbe	10 - 15
Zebe	50
Adgbodjedo	30
Anavie	10
Djitin-Aga	20
Houeze	-
<b>TOTAL</b>	<b>60 to 65</b>

(Source: ANTEA, November 2019 and August 2020)

#### 6.5.3.3.2. Support of vulnerable groups

Existing support locally, social affairs and support to disadvantaged groups are managed by the Centres for Social Promotion (CSP). CSP are grassroots community development support centres set up by the Ministry of Social Affairs and Microfinance in the various municipalities of Benin.

Their mission is to ensure the application of the policies and strategies of the Ministry and to:

- Provide support and advice to individuals, families, groups, associations and local elected officials if necessary;
- Contribute to the advancement of the family, women, children, adolescents, persons with disabilities, seniors and any other vulnerable social group;
- Organize information, awareness and social mobilization sessions on various subjects relating to the improvement of the conditions and standard of living of the population;
- Supervise reception, education, training and orphanages structures;
- Provide psychosocial care for victims of HIV / AIDS in general and Orphans and Vulnerable Children (OVC) in particular;
- Identify and support women's groups through advisory support;
- Oversee the census of extreme poor and non-extreme poor household heads.

There are a CSP in Ze and in Tori-Bossito. In Ze, the CSP suffers from a lack of resources granted by the Ministry and of a lack of capacity of action (PDC of Ze, 2019). In Tori-Bossito, the CSP has a limited coverage because it does not have offices in the different villages, it lacks personnel and equipment (PDC of Tori-Bossito, 2018).

According to these CSPs, support to vulnerable groups is provided, or not, as below:

- **Persons with a handicap:** they do not benefit from any support from national or local governments. However, they are encouraged to form associations and helped in their registration process so that they can benefit from direct support from the government or from NGOs.
- **Orphans:** orphans can rely on 4 orphanages and shelters which are run by NGOs or religious organisations in Ze. Tori-Bossito also counts 4 shelters (see § 1.1.1.1). Orphans also receive support from the local CSP or private organisations. Either the remaining living parent is supported by the centre, or the child receives donations from NGOs or the government.
- **Very poor households:** they will be able to benefit from the government project of Insurance for the reinforcement of the human capital. This project aims at providing very poor with an access to health insurance, training, access to credit and pension insurance. It has not yet been deployed in Tori-Bossito and Ze.
- **Elders:** elders are encouraged to gather into groups and engage into income generating activities (crop farming, animal breeding, basketry, etc.). Apart from that, they do not receive any kind of support.

The government does not provide support to vulnerable groups in the form of direct assistance through regular allowances.

Several NGOs have been active in the support to these groups: AIDE and ACTION (support to school enrolment), PEACE ONG, GRAIN (access to water in villages), OXFAM QUEBEC, GERME ONG, CARITAS BENIN (sanitary, nutritional and social support to vulnerable groups).

#### 6.5.3.4. Ethnic groups and languages

At the level of the Atlantic Department, the ethnic groups essentially encountered are:

- Fons and related parties 76.3%;
- Adjias and related 15.6% (RGPH 4, 2013).

In the municipalities of Tori-Bossito and Ze, the majority ethnic groups are the Aizo<sup>9</sup> in Ze and Tori (local Aizo group) in Tori-Bossito, which are indigenous to the area. Aizo belong to the larger Adja ethnolinguistic group, which also encompasses Fon, Ewe, Xla and other ethnic groups of southern Benin.

Each municipality has a multi-ethnic profile:

- The municipality of Tori-Bossito, composed mainly of the indigenous Aizo ethnic group (also called Tori) with Tori, Fon and related (84%), also includes other socio-cultural groups with Yoruba (1%), Adja and related (13%), and others (1%) (PDC of Tori-Bossito, 2018).
- In the municipality of Ze, the dominant ethnic groups are Aizo and Wemenou (97.4%). Nevertheless, the Goun, Fon, Nago, Toffin, Yoruba and others are also encountered there (PDC of Ze, 2019).

In the villages of the study area, the main ethnic group reported is usually the Aizo followed by Fon, Adja, Mahi, as well as Mina, Peuhl (Fulani) and Yoruba. Fon, Adja, Mahi and Mina are regarded as minority groups by villagers. The peaceful cohabitation between all these groups shows the tolerance and openness of the members of the Aizo groups towards other ethnic groups.

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<sup>9</sup> Also written as Ayizo.

In most villages, there is a strong social homogeneity with a dominant clan claiming a common ancestor which is generally the village founder. The clan is split into several families that are each settled in distinct neighbourhoods.

Although French is the official language in Benin, other languages spoken at the national level are Fon, followed by Yoruba, Bariba, Goun, Adja, Aizo, etc.

In the study area, the main languages mentioned as spoken are Aizo, Fon and Adja.

#### 6.5.3.5. Migratory movements and presence of migratory or nomadic populations

According to the PDC of Tori-Bossito, the municipality of Tori-Bossito is marked by 2 types of out-migration:

- Seasonal migration: more than 40% of young persons leave their villages during the dry season when rural activities are slow. They travel to the surrounding towns to practice motorcycle taxi driving or seasonal employment. They return to their villages once the dry season is over, or during their families' traditional celebrations.
- Permanent migration: 12% of young persons leave their villages permanently. They migrate to the surrounding towns and countries in the sub-region (mainly Nigeria and Togo). Young persons also go to West African countries such as Ivory Coast and Liberia.

In the municipality of Ze, migration also concerns unemployed youths who temporarily become "motorcycle-taxis" in neighbouring towns, young pupils and students looking for holiday jobs as workers, sales agents, street vendors, and women who are hired as domestic servants in host families.

The rural exodus tends to empty the municipality of its agricultural assets. The villagers of the study area, who constitute a potential pool of labour for the Project, are forced to emigrate to Nigeria and neighbouring countries where the development of the construction sector and the agricultural sector offer better employment opportunities.

External migration thus occurs under the pressure of rural poverty, unemployment and lack of opportunities in sectors attractive to young persons, many of whom are disengaging from agriculture due to a lack of interest and profitability of the activity. On the whole, migration flows have a negative impact on the socio-demographic and economic indicators of the municipalities in the study area.

Migration concerns both youths and children who are forced or willingly employed by their parents to contribute to household expenses. Child labour is a real problem, leading to high school dropout rates and exposing children to human trafficking.

Alongside these migrations, the area is crossed by nomadic Peulhs who are bringing their cattle to graze in southern Benin during the dry season, when pasture and water lacks in the Sahel region where they usually spend most of the year.

Migratory movements in the villages of the study area take 2 main forms:

- In-migrations composed of urban individuals coming from Benin main cities (Cotonou, Porto-Novo, Adja) and even from abroad in order to buy land in the area with a speculation motive and of rural individuals coming from northern regions (Mahi region for instance, Adja or Fon) in the look for more fertile land.
- Out-migrations, mostly from young persons driven by the search for job opportunities or studies in town (Cotonou, Calavi, Porto-Novo) or even abroad.

Migrants are welcomed if they do not try to bind with women from the study area or to grab land (cf. § 6.5.4.1).

#### 6.5.3.6. Habitat

In the majority of the villages in the study area, the houses are built of mud with a wooden frame and a roof of straw or sheet metal. The building materials are taken locally from the natural environment. This type of dwelling has a limited lifespan and requires frequent repairs to replace the roof or consolidate the walls.

There are also dwellings that are built of final material with roofs made of sheet metal or slabs. These dwellings are found mainly in the district capitals of Tangbo-Djevie and Tori-Cada, in larger towns such as Tori-Gare and in the capitals of municipalities. This type of housing is an asset that can reduce the degradation of natural resources. It shows a certain level of income of the owners.



(Source: Antea, November 2019)

**Figure 84 : Houses observed in the impacted districts of Tangbo-Djevie and Tori-Cada**

The villages of the municipality of Tori-Bossito in the study area (Gbetaga, Sogbe, Zebe and Dokanme) are far from the main roads and only accessible by laterite tracks in poor condition. These villages are very landlocked and particularly isolated during the rainy season when the state of the roads deteriorates. The habitat is concentrated around a single, dense village nucleus.

The villages in the municipality of Ze (Agbodjedo, Anavie, Djitin Aga and Houeze) have a different occupation of space: the village nuclei are more diffuse and less dense and the habitat is more scattered along RNIE 2.

Throughout the Project area, there are scattered agricultural and residential buildings. Based on the satellite images, the construction of these houses seems to have accelerated between 2011 and 2020, probably as a result of the sale of land to city dwellers who wanted to build a house on their land to secure their occupation or set up their agricultural activity.



House in a vegetable garden

House in maize field

(Source: Antea, November 2019)

**Figure 85 : Dwellings on the site**

## 6.5.4. Culture and cultural heritage

### 6.5.4.1. Customs and values

Each of the impacted villages has its own history and form of social organization. Nevertheless, the common point is that the inhabitants of these villages are Aizo, and that they share the same morals and customs.

Among the customs observed locally, the main ones govern the place of women in society. Thus, we can observe the persistence of:

- the practice of polygamy;
- the levirate, who forces a woman upon the death of her husband to marry his brother or nephew.

Women are highly valued by these communities who would not tolerate that they are courted by members outside their milieu. Land is also highly valued in the eyes of the villagers, as it enables them to ensure their subsistence.

These assets, women and land, are the main sources of conflict for these communities with outsiders coming into their environment. However, these communities remain very open to outsiders with whom they have a very good relationship.

Other customary laws exist. They are oral and include rules or regulations regarding resource use, sharing of traditional knowledge, and the timing of important socio-cultural events.

Prohibitions in the study area include the following:

- practicing field work every 8 days (awhlin);
- weeding on market days in Tori-Bossito;
- hunting pythons;
- the search for wood energy in the sacred forest of Oro Zoun, a forest where the deity called Oro is erected (outside the Project area).

### 6.5.4.2. Religions

In the study area, traditional religions mainly linked to the Voodoo cult and imported religions coexist with the representation of Catholics, Protestants, evangelical churches and heavenly Christians. Other cults include the Jehovah's Witnesses or International Evangelical Mission of Faith. Islam is also present in the impacted villages of Ze.

The table below presents the number and type of imported religious infrastructures present in each village of the study area. These infrastructures belong to 3 different churches:

- Catholic church
- Celestial Christianity church
- Evangelical church

The Figure 86 shows the location of these churches.



**Table 34 Religious infrastructures in the villages of the study area**

District	Village	Number of infrastructures	Type of infrastructure
Tori-Cada	Dokanme	3	Catholic church Celestial Christianity church Evangelical church
	Gbetaga	4	Catholic church Celestial Christianity church International Evangelical Mission of Faith
	Sogbe	3	Catholic church Celestial Christianity church International Evangelical Mission of Faith
	Zebe	3	Catholic church Celestial Christianity church Evangelical church
Tangbo-Djevie	Agbodjedo	3	Catholic church Celestial Christianity church Evangelical church
	Anavie	3	Catholic church Celestial Christianity church Evangelical church
	Djiti-Aga	3	Catholic church Celestial Christianity church Evangelical church
	Houeze	3	Catholic church Celestial Christianity church Evangelical church

(Source: ANTEA, November 2019 and August 2020)

Religious practice remains dominated by the Voodoo cult with the presence of various Voodoo divinities and temples such as kouvito, oro, thron, sakpata, legba, dan, zangbeto. Each village has its own set of tutelary divinities and organises its celebrations accordingly. Tam-tam, libations and prayers are regularly address to these divinities.

There are traditional rites that are organized in each village once a year at periods agreed upon by the communities of each village such as the rite of the day ghost (ghost rite), the rite of the night ghost (oro), the voodoo thron rite, among others.

Besides, there is an annual celebration in each village named “*xwe tanu*”. There are also national celebrations such as the Voodoo celebration on 10th of January each year or the “*tori xwe*” or Tori celebration.

#### **6.5.4.3. Presence of sites of significant cultural value**

As seen on the Figure 86 below, most of the sites of significant cultural value such as sacred sites or places representing traditional beliefs (Voodoo divinities’temples for example) are located in the immediate surroundings of the villages, far from the Project site. Cemeteries and tombs are also located in the village’s vicinity. These community cultural sites are the object of rites and sacrifices whose periods are defined by the dignitaries of these cults.

However, according to the testimonies of the village elders and communities provided during the social field survey, “not all deities can be erected in the settlements, there are deities who are on the site and only the followers can have access to these places. Likewise, the landowners protect their farmland with sacred and practical objects that are not accessible to all”. Therefore, there might be sacred sites on the Project footprint, important for small groups of persons or for individuals.

On the Project site, there is however a major sacred site present: the sacred forest of Anavie, visible on the Figure 86. This forest is home to a "dan", a sacred spirit of the Voodoo cult. It is accessible only to initiates and must not be destroyed. It is directly attached to the village of Anavie, which uses it for its rites. Other villages such as Djitin-Aga, Anavie and Houeze also use this forest. No other sacred forest is located within the Project's footprint.

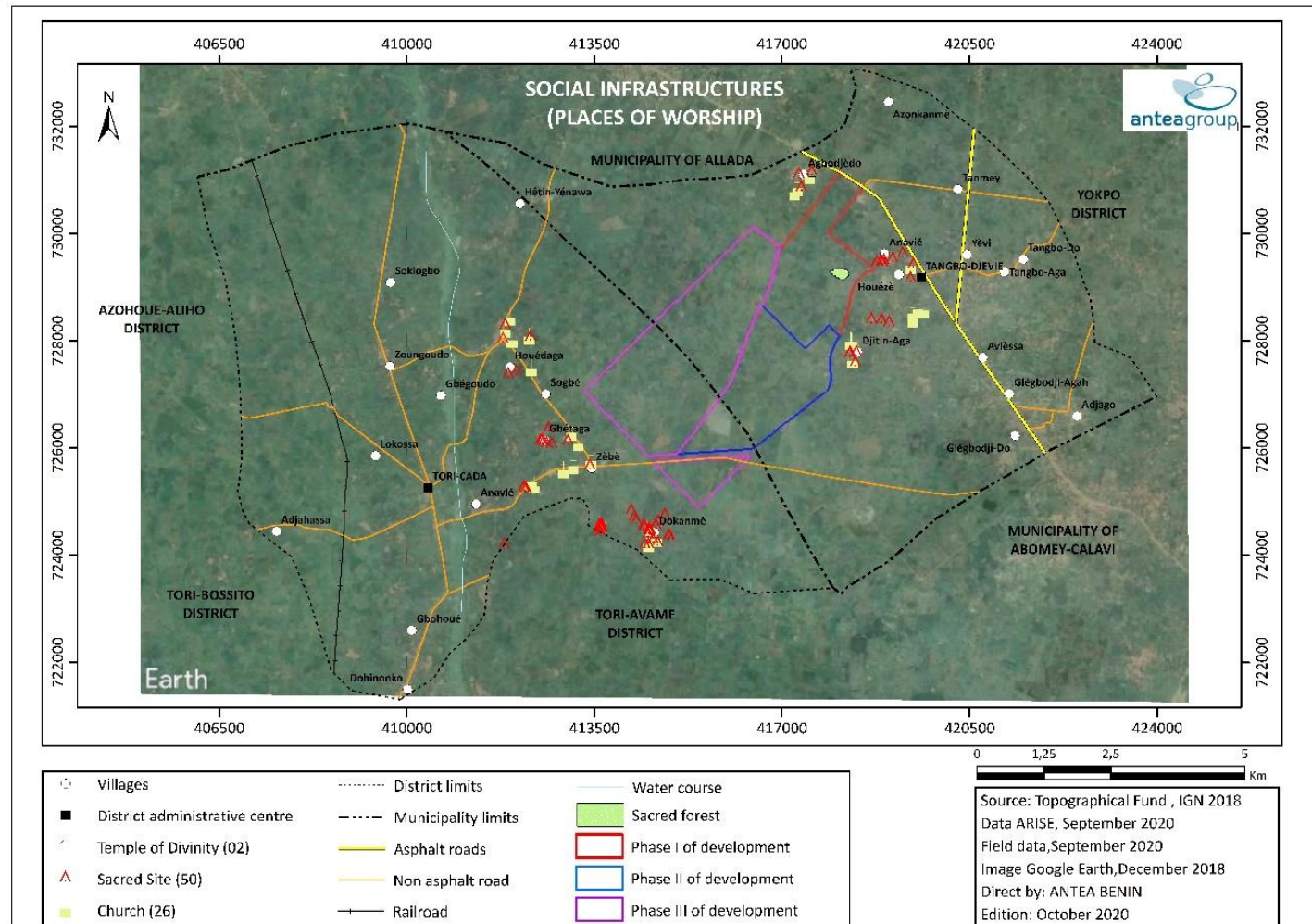


Figure 86 : Places of worship in the study area

#### 6.5.4.4. Archeological potential

Even though there are no proofs of the presence of archeological assets in the Project area, the archeological potential of Benin is high due its rich history with the kingdom of Dahomey, the slave trade and the strategic position of the country on maritime trade routes. It is therefore possible that some archeological artefacts are buried under the soil of the Project site.

#### 6.5.5. Women and gender issues

##### 6.5.5.1. Overview

Gender rights in Benin are defined either by formal or customary laws. Customary laws, inherited from a patriarchal system, are unequal towards women and allow for continuous application of several discriminatory practices in the country.

The Code of Persons and Family enacted in 2004 tried to tackle the continuous application of customary laws in the family and marital matters by stipulating that they ceased to be enforced in its article 1030. The Code reminds or introduces important provisions such as:

- Consent of both parties in the marriage and prohibition of forced marriage.
- Legal age of marriage at 18.
- Equal rights to inheritance for male and female heirs.

Besides, numerous progresses were achieved by the country in the recent years, thanks to actions of the government and especially the ministerial Direction of women and gender promotion, alongside with national and international NGOs. Progresses were particularly strong in the field of women empowerment, fight against gender-based violence and participation of women to decision-making institutions.

All these elements contributed to the good grade that Benin has received from the OECD and its Social Institutions and Gender Index (SIGI) in 2019. The SIGI is a cross-country measure of discrimination against women in social institutions. On a scale of 5, it rates Benin as having a medium (or 3) level of discrimination.

However, as observed in the study area and underlined in the SIGI 2019 report for Benin, women in rural environments continue to be subjected to discriminatory practices, to suffer from exclusion from decision-making processes and to violence.

The major aspects of these unequal treatments are:

- Application of physically degrading widowhood practices upon the death of the husband and seizure of the women assets by the in-laws.
- Perception that women hold traditionally subordinate roles within the context of reproduction, household responsibilities and child care, the husband being the decision-making figure.
- Exclusion of women from inheritance, especially land.
- Continuous prevalence of violence against women such as domestic violence and sexual harassment.
- In the study area, women have a low involvement into the political life and decision-making processes but are very engaged into economic activities, especially trade and transformation of agricultural products. They are structured into dynamic women groups for social or

economic promotion (such as saving groups). They however continue to suffer from unequal treatments in terms of inheritance, widowhood, marriage and from gender-based violence.

#### **6.5.5.2. Women education, training and economic activities**

Focus-groups with women highlighted that women reached primary to secondary education but in most cases, dropped out of school because of early marriage, lack of money for their education or need to work to sustain their families.

Women are involved into various activities from trade, hairdressing, sewing to the sale or transformation of farm products such as cassava flour, palm oil. Trade and handicraft are a particularly important source of incomes for women. As underlined by the Ze local development plan, trade is a sector dominated by women, a fact that is visible in the local markets. Women are less involved into farming activities than men. They however work along men in the pineapple cultivation although the incomes generated from this activity are for their husbands.

Women would like to receive supports in training for production of cosmetic products, sewing, transformation of farm products, among others.

Although both spouses bring incomes, women usually keep their incomes separately from their husbands' incomes, as there is no common savings in the household. Both household members can integrate local saving groups ("tontine") with the agreement of their spouse. Men and women have to reach an agreement for the major spending in the family (related to education or health). Women must ask their husbands permission when they want to engage important spending or when they want to get a credit.

#### **6.5.5.3. Personal relationships and gender-based violence**

Women can get married between 15 to 18 years old. They can also get pregnant at the same period. They usually enter polygamous households as co-spouses as polygamy is widespread. Some young girls are reported to enter forced marriage early, especially among poor households. The dowry practice is still widespread.

In some villages, women did report prostitution and domestic violence during the focus-groups. According to Tori-Cada health centre, domestic violence occurs but is not frequent.

However, the PDC of Ze and Tori-Bossito underline that violence based on gender are more widespread than thought.

In the Ze city, "social relationships are often to the disadvantage of women and girls" with men exerting violence against women to prove their superiority. The Centre for Social Promotion, which receives and handles gender-based violence claims from women and girls, reported 691 claims from women and girls from 2014 to 2018, on average 138 claims a year. However, they highlight this is only the "tip of the iceberg" as most violent cases remain unreported.

In the Tori-Bossito city, 990 claims were registered from 2012 to 2016, an average of 198 claims per year. Women are not involved into the decision-making process in this area due to their low level of instruction, the burden of tradition, their focus on household activities, etc. Young girls are reported to suffer from sexual harassment from their teachers, and some engage into disguised prostitution after dropping school.

#### **6.5.5.4. Women's place in local governance**

In the Atlantic Department in general and in the municipalities of Tori-Bossito and Ze, women are practically absent in the management of the city. Women are only allowed to sit on decision-making



bodies when they reach an age considered wise by the community or when the subject to be debated concerns them directly. But their voice remains purely consultative.

In Tori-Bossito, among the 13 local elected officials who make up the Communal Council, no woman is present. The same is true of the various district chiefs or village chiefs.

Factors influencing women's low involvement in decision-making include women's low level of education, the weight of tradition, household occupations and lack of solidarity among them, lack of self-confidence, low material capacity (time and financial means to engage in politics), etc.

On the other hand, certain factors could favour a strong participation of women in decision-making, namely: literacy and schooling, especially for girls, keeping girls in school, leadership of women's groups and the implementation of the national policy for the promotion of women (2008).

In the municipality of Ze, there are several obstacles to the proper representation of women in decision-making bodies. These obstacles are of a political and socio-cultural nature. Politically, women are not very visible in the municipality. They are strongly mobilized and instrumentalized during electoral contests, but they are very little present on the electoral lists or very badly positioned on these lists.

This situation is perceptible in the Ze municipal council, which has only one woman. It should be noted that the latter is the only female head of the borough in the municipality. Among the political obstacles is also the lack of determination of women whose candidacies are rarely personal initiatives. This lack of ambition observed among women, far from being surprising, is only a logical consequence of the socio-cultural burdens that exclude women from the political arena.

Overall, this virtual absence of women from all the municipality's governance and decision-making bodies contrasts with the roles that society confers on them. Indeed, they are generally expected to make an important contribution to the well-being of the family and the community in terms of health, education, food, nutrition and economics. Women, through their dynamism in all sectors, are perceived as the pillar of the family, and even of the community in the various areas mentioned above. However, sociological, cultural and religious burdens continue to inhibit her initiatives, hinder her education and school retention, and cause the municipalities of Tori-Bossito and Ze to lose enormous development potential.

#### **6.5.5.5. Gender and access to land**

Based on oral data collected in the field, men and women do not have equal rights of access to agricultural land. Women are not entitled to inheritance when their father or husband dies. Inheritance goes to her brothers and male children in either case. Women may be allowed to work on the land but are not recognized as the owner.

Nevertheless, they are allowed to work on the land that is made available to them by their siblings. They can also continue cultivating their husbands' land upon their death. The main lowlands, especially the riverbanks, are used by women for market gardening, food crops, etc. The land is used for the cultivation of vegetables and other crops. As for the other lands or the farms and holdings found in the municipality, it is mainly men who farm these areas, but women are involved in the work.

Women are aware that they should inherit equal land shares with their brothers according to the Code of Persons and Family. However, they remain vulnerable to land eviction from their brothers who can take back the land whenever they want, and from their in-laws who can grab it from them when the husband passes away.

#### **6.5.6. Economic activities and livelihoods**

#### 6.5.6.1. Local economic activities

The economic activities observed in the Atlantic Department reflect the socio-economic situation that can be found within the study area. The economic activities observed in this department include agriculture, fishing, hunting, trade, tourism, communication and transportation. In the municipality of Tori-Bossito and Ze, agriculture, hunting and fishing mobilize a variable percentage of actors: 51.9% in Tori-Bossito and 51.5% in Ze.

The main activities observed in the study area can be classified into 3 groups:

- Farming: crop farming, animal rearing, etc.
- Trade: sale of farm products, transformed farm products, livestock.
- Handicraft: hairdressing, sewing, carpentry, weaving, electric, blacksmith, welding, mechanics, masonry, scrap dealing.
- In the 8 villages surrounding the Project perimeter, the main livelihood strategy relies on the exploitation of several forms of natural resources. The primary livelihood source is agriculture, completed by domestic animal husbandry and hunting.

##### 6.5.6.1.1. Agriculture and arboriculture

In the municipality of Tori-Bossito, 80% of the population works in the agriculture sub-sector, working for the food security of the local population through the production of cereals, tubers, fruits and vegetables. The land is heavily used for plant production and is also being developed for the installation of perennial and annual crops such as oil palm, banana or teak. Market gardening is also gradually developing in the flood plains such as along the Lama depression.

As agriculture is the dominant activity, the surface of fields is constantly increasing. As a result, large areas of natural vegetation have been and continue to be sown for agriculture. This expansion of agricultural land has resulted in the almost total disappearance of forest areas in the Project area. In addition to family farms, there are numerous agricultural estates such as the "Eco-Jacqueville Farm" in Tori-Bossito.

Cereal production (mainly maize) and root crops (cassava, sweet potato) are the main crops and occupy 59.2% and 36.7% respectively of the annual cultivated area, which totals an average of 9,971 ha in Tori-Bossito.

As in Tori-Bossito, agriculture is practiced in all the villages of the municipality of Ze, where it occupies more than 95% of the population. Farming is not very mechanized and is practiced on a total area of about 41,105 ha. More than 50% of the farms are between 5 and 10 ha and about 40% between 10 and 25 ha. Large farms exceeding 50 ha account for only 5% of the total area (PDC of Ze, 2019). The speculations commonly encountered are:

- commercial crops (pineapple, oil palm, acacia, teak, etc.);
- food crops (maize, cassava, peanuts, cowpeas, sweet potatoes, rice and taro);
- fruits and vegetables (tomatoes, chilli, okra, leafy vegetables, bananas, citrus fruits, mangoes, papayas, etc.).

In Ze as in Tori-Bossito, pineapple cultivation is intensifying year after year thanks to a very good soil fertility and especially since the pineapple of the Sugar Loaf variety was labelled in 2017. This variety has in fact obtained the status of geographical indication granted by the African Intellectual Property Organization.

Pineapple growing is a long-term investment, since it takes 2 years to reach maturity.

Pineapple has been the subject of an extensive program of support from FAO between 2017 and 2019 through the program "Improvement of productivity, competitiveness and development of a geographical indication of Benin's bread pineapple", launched in July 2017. The project, funded by FAO at a cost of FCFA 300 million (€457,000) over 2 years and implemented by Benin's National Institute of Agricultural Research, aimed to increase the profitability of the Sugar Loaf variety, the most widely grown variety in the country (75% of Benin's pineapple production), by focusing in particular on ways to strengthen production and ensure the quality criteria and standards required to enable producers and processors to sell their products more easily on regional and international markets.

In both municipalities, deep changes have affected the local agricultural yields and farmers' practices:

- A constant decrease in production levels and yields especially for cereals, caused by soil depletion due to excessive use of intrants, reduction of soil moisture caused by climate change and the disengagement from farming activities (especially among the youths) in favour of trade and other activities.
- The disappearance of soil fertility techniques such as crop rotation and fallow due to the desire to maximise production.
- Climate change with decreased rainfalls, increased drought periods and more irregular seasonal patterns leading to an unreliable agricultural calendar which farmers do not master anymore.
- Poor quality of seeds unsuited to the new climatic conditions.

All these factors affect the crop production levels and seasonal availability of food products for the population. Although it is not possible to talk about food insecurity, some occasional food shortages are reported by local villages (cf. § 6.5.7.1.2).

In the study area, agriculture is the main activity of the population of the impacted villages. As shown on the land use map below, most of the Project area is either cultivated or in seasonal fallow.

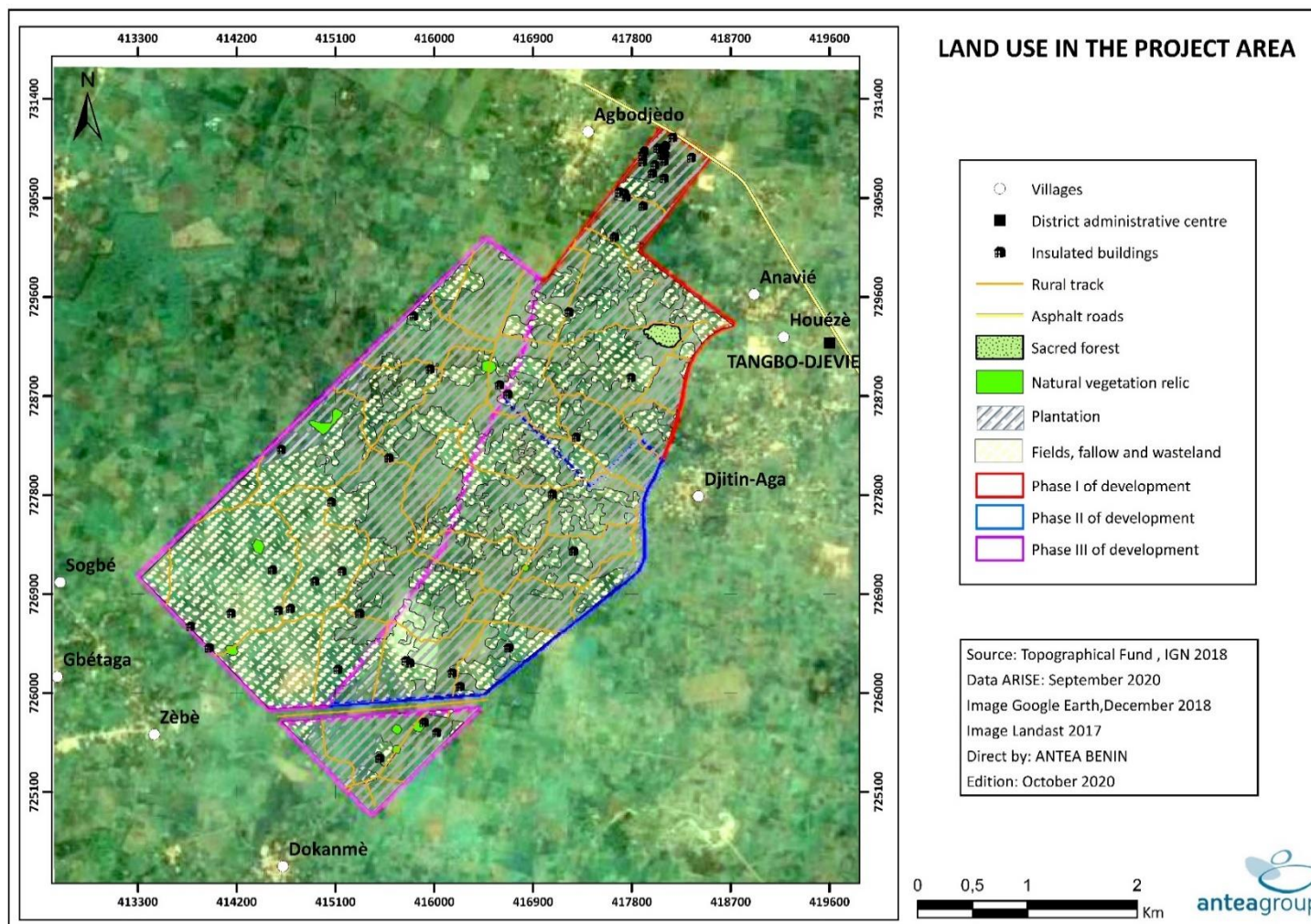


Figure 87: Land use map in the Project area

Agriculture is mainly for subsistence but also commercial purposes. There are 2 ways to manage farmland:

- Direct exploitation by the owner: the owner cultivates his own land, with the help of farm workers that are hired for occasional tasks.
- Land rental: the land owner rents his land to a farmer. Rental period is of 2 years at a price of 200,000 FCFA/ha. This amount is paid upfront at the beginning of the rental period and rental contracts are usually unwritten. The tenant is the owner of all the food products he grows.

A farmer can cultivate on land assets from 1 to 100 ha, most of the assets being composed of several land parcels. While most assets are dispersed in the same locality, some farmers have land assets scattered across several villages.

Agriculture is mostly rain-fed agriculture and therefore vulnerable to climatic hazards such as drought. Some farmers have invested into irrigation systems composed of borewells, sometimes equipped with pumping systems. They can sell water to other farmers, at a price of 25 FCFA/jerrycan.

Agricultural activities (ploughing, sowing, harvesting) are not very mechanized and are still traditionally carried out with tools such as hoes, axes and machetes. In order to compensate for the lack of mechanization, farmers rely on a large workforce and organize themselves into associations to help each other in field work. The use of chemical inputs and especially fertilisers (such as NPK, IRE, urea, Potasse, Kastel) is observed in the area for specific crops such as pineapple and palm tree.

The most widely cultivated species are pineapple, oil palm, maize and cassava. While pineapple and oil palm are cash crops, maize and cassava remain food crops used mainly to feed the population. Other products are grown such as yam, sweet potatoes, watermelon, bananas, tomatoes, chilies. Fruit trees such as mangoes, oranges, guavas, papaya, soursop, banana are also numerous.

The crop productivity depends on the type of crops, use of inputs and soil conditions. For maize, yields can reach 1.8 to 2 tons/ha per year with 2 harvests, generating 3.6 to 4 tons/ha. Farmers complain about climate change which causes droughts or excessive rainfalls.





Cassava crops in the project's right-of-way



Pineapple crops on the project site



Maize crops on the project site



Beef breeding on the project site

(Source: Antea, November 2019)

**Figure 88 : Economic activities on the site**

The outlets for agricultural products in the study area are at the farmgate or on local, regional and cross-border markets (especially to Nigeria before the border was closed). Farm products are transported there by motorbikes or taxis. Often, buyers come in the field to buy products directly from farmers. Alternatively, farmers sell their crops on a wide range of markets such as Tori-Gare, Ze Plaque, Pahou, Sekou, Cococodji, Seme, Dan-Tokpa (Cotonou). There are important commercial outlets for farm products from the study area, thanks to its proximity with Benin main cities and good road connectivity through RNIE 2.

Farmers underlined during focus-groups that although they do not know how calculate the revenue they get from farming, their “benefits are enormous”.

Women are very involved in agricultural activities, either in collaboration with their husbands during work in the fields or in the processing of agricultural products. Thus, food processing concerns different products:

- cassava in gari and tapioca,
- maize paste called *akassa*,
- peanut pancake called *kouli-kouli*,
- palm nuts in red oil,
- distillation of palm wine into *sodabi*,
- preparing the pineapple juice.

Processing techniques remain simple and can be done manually with a pestle or using mechanized mills. Women are the most involved in the processing and most often organize themselves into groups.

The products resulting from these transformations are sold at the local level, to the villagers, but also in local and communal markets. The area's high agricultural production coupled with its proximity to major urban centres facilitates the sale of processed products.

However, agri-food processing is faced with difficulties such as "the lack or insufficiency of financial capital, archaic working methods and tools, difficulty in obtaining raw materials and selling products due to the poor state of access roads" (PDC of Ze, 2019).

#### **6.5.6.1.2. Livestock farming**

In the municipality of Tori-Bossito, domestic livestock farming is the most developed and involves poultry, goats and pigs. Despite the availability of natural resources, livestock (cattle) farming has not been able to develop because of trypanosomiasis and the unavailability of natural grazing areas due to the prevalence of agriculture. On the other hand, small-scale livestock farming (small ruminants such as goats and sheep, poultry) has developed relatively well while non-conventional livestock farming (snail farming, rabbit farming) is still poorly known.

After agriculture and the processing of agricultural products, livestock farming is the third economic activity in the municipality of Ze. It is an activity that is essentially complementary to agriculture and is not carried out professionally. Small-scale animal husbandry is practised by all sections of the population and in all the villages of the municipality. The main animal productions are poultry, sheep, goats, pigs, cattle, rabbits etc. As far as pigs are concerned, local pigs are more dominant.

In the villages of the study area, almost all households own small cattle (small ruminants, chickens, ducks, rabbits, pigs) for domestic animal farming. They use locally available resources to feed their animals.

There are also both nomadic and sedentary cattle breeders. The transhumant herders are of Fulani ethnicity. They cross the study area with their herds during the great transhumance that lasts from February to May.

Some indigenous herders from the villages bordering the Project also have herds of cattle that they keep in bouveries. In Tangbo-Djevie, there are thus many herders among the local population. They hire the Fulani to lead their cattle to pasture.

#### **6.5.6.1.3. Fishing**

The municipality of Tori-Bossito has relatively little river coverage that would allow fishing. There are only a few swampy shallows that are suitable for fish farming in the districts of Avame, Tori-Cada, Tori-Gare and Tori-Bossito. There is no open water fishing because there are no real bodies of water.

As for the municipality of Ze, there are a few rivers that are favourable for fish production. Fishing is practiced mainly in 3 districts of the municipality crossed by the tributary (So) of the Oueme River, namely the districts of Djigbe, Houegoudo and Hekanme.

The populations of the villages of the study area do not practise fishing.

#### **6.5.6.1.4. Trade and industry**

The commercial sector is animated by agricultural products, the products resulting from their processing (red oil, *gari*, tapioca, pineapple juice), palm wine, as well as imported products that are sold in various points of sale that are the markets of Tori-Gare, Sekou and surroundings, as well as in restaurants in the area.

Pineapple is one of the foodstuffs produced in the study area for export to countries bordering Benin. The closure of the border with Nigeria has penalized these exports, affecting the incomes of local farmers.

According to communal data, enormous difficulties are hampering the development of commercial activities in the municipality of Tori-Bossito. These include:

- the very advanced degradation of the access roads;
- the non-existence of markets in certain districts;
- the flooding of some markets during the rainy season;
- the defamation of the markets by certain inhabitants (religious sacrifices, coffin deposits, etc.);
- the low involvement of market management committees in tax collection; etc.

Commercial activities in the municipality of Ze are organized around 5 local markets, the most important of which is that of Ze-centre, which has large-scale transactions with merchants from Cotonou and neighbouring municipalities.

As far as industry is concerned, it is almost non-existent in the study area. There are, however, a few pineapple juice production units and sawmills that do not have modern infrastructure. Many factors are hindering the real take-off of the industrial sector, such as the lack of real industrial policy and the shortage of skilled labour and raw materials.

#### **6.5.6.1.5. Hotels and tourism**

Although the municipality of Tori-Bossito has important tourist potential, there are still no developed sites that could generate significant tourist activity. However, we note the emergence of a site called " Ferme Eco-Jacquerville " located in the district of Tori-Cada. The latter includes among others: a reception centre, fish ponds, playgrounds. The municipality also has other sites of tourist interest.

Since 2016, the municipality of Ze has had a number of hotels and hostels to ensure that visitors enjoy a good stay. However, catering services are very poorly developed.

In the villages of the study area, there are no tourist sites or hotel infrastructures.

#### **6.5.6.1.6. Crafts**

Rural craftsmanship, which is very underdeveloped, is limited to the processing of forest products into craft products such as basketry products (baskets, vans, mats, baskets) and agricultural tools. In addition, it is noted that the craft industry relies mainly on seamstresses and weavers, masons, carpenters, painters and two-wheel mechanics. The municipalities are also home to wood carvers.

The municipality of Ze has a collective of craftsmen which is currently undergoing restructuring. The craft industry is very active and is represented by all the trades, among which are:

- the craft trades, which include the trades that deal with repairs and services such as carpentry, sewing, hairdressing, photography, mechanics, masonry, etc. This category of handicrafts is relatively and equally occupied by both women and men;
- production and processing crafts, which include such trades as welding, basketry, forging, etc., are not very developed;
- the craft of processing and preserving agricultural products, including the transformation of cassava into gari and tapioca, palm nuts into red oil. The processing of agricultural products is one of the strengths of the municipality in terms of trade. The products resulting from agricultural processing are highly prized and encourage the development of trade.

Constraints to the exercise of these professions include the lack of continuing education, poor access to credit and the low purchasing power of the population. The creation of trade centres and the promotion of the local economy will provide development opportunities for the sector.

#### 6.5.6.1.7. Use of natural resources

The Atlantic Department is largely cleared from forest vegetation and the original equatorial forest now exists only in small patches of negligible size. At present, the vegetation is shrubby, associated with dense stands of oil palms that are found either in their natural state or in industrial plantations.

In this largely anthropized environment, the local populations nevertheless use many natural resources, such as medicinal plants or animal resources. Indeed, hunting and gathering continue to be practiced in the study area.

Hunting provides food supplements to families in addition to their agricultural production. Gathering mostly target medicinal plants, more rarely food products. Villagers also use soil and wood resources to build houses, which contribute to erosion and deforestation in the study area.

The main natural resources that are used by villagers are presented in the table below.

**Table 35 Natural resources used in the study area**

Category	Type of resource	Use	Collection area	Collection period
Firewood	Teak, guava, mangoe or orange trees, plam tree	Energy for cooking Charcoal production to a lesser extent	In the fields, in the village	Dry and rainy season
Construction wood	Teak, eucalyptus, acacia	Construction of houses and dependencies Carpentry and woodwork	In the fields, in the village	Dry season
Soil	Laterite	Construction of houses and dependencies	In the village when individuals dig wells	Dry season
Bush meat	Partridge, porcupine, deer, palm rat, agouti, squirrel	Food and trade occasionnally	In the fields not far from villages	Dry season
Wild berries and plants	“Kpatinma” or hyssop leaves, “kinkeliba”, neem tree, “Dawe” (bamboo)	Food, trade and medicine (treatment of malaria, liver disease or diarrhoea)	In the fields, in the village	Rainy season
Palm trees	Palm tree	Food for human and animal consumption Local beverages (sodabi) Medicine and cosmetics Fire Basketry Construction material (roof, walls, fences)	In the fields, in the village	Dry and rainy season

(Source: ANTEA, November 2019 and August 2020)

The table below presents some of the medicinal plants that are used locally along with their virtues.

Table 36 Medicinal plants in the study area

Plant local name	Scientific name	Disease treated	Collection area	Collection period
<i>Quinkelibat</i>	-	Malaria, typhoid fever	Bush or village	All year long
<i>Qininiman</i>	<i>Azadirachta indica</i> (Neem tree)	Malaria, typhoid fever	Bush or village	All year long
<i>Hlinhoue</i>	<i>Phyllanthus amarus</i>	Diarrhoea, vomiting, liver, cough	Bush or village	All year long
<i>Acacia</i>	<i>Acacia spp</i>	Malaria	Bush or village	All year long

(Source: ANTEA, November 2019 and August 2020)

#### 6.5.6.2. Ecosystem services

Ecosystems provide many services known as ecological services or ecosystem services. These services represent the benefits that ecosystems provide to human societies. The table below summarizes the main ecosystem services identified in the Project area.



**Table 37 : Ecosystem services of the Project area**

Ecosystem Services Group	Ecosystem Services	Location	Positive impacts of ecosystem services
Supply Services	Human food (fruits and vegetables)	Fields and fallow land	Agriculture provides edible fruits and vegetables for human wellbeing
	Medicinal plant	Old fallow land and fields	Medicinal plants are used in the pharmacopoeia for the treatment of certain diseases faced by residents.
	Fodder for livestock	Old fallow land and fields	Livestock are fed with available fodder (mango leaves, palm leaves, etc.) and crop residues.
	Firewood/ Charcoal	Plantations and old fallow land	Fuelwood from plantations and old fallow land is the main source of energy for cooking at the household level. The clearing of new land for agriculture leads to the cutting of wood for charcoal, mainly for commercial purposes.
	Small game hunting	Plantations, old fallow land and fields	Hunting products (aulacode, francolin etc.) are a source of protein in households.
Regulatory Services	Air Quality	Forest patches; old fallow land and plantations	The existence of trees and other vegetation in the environment provides better air quality by removing pollutants from the atmosphere.
	Climate regulation (carbon sequestration)	Forest patches; old fallow land and plantations	As trees and other plants grow, they capture carbon dioxide (CO <sub>2</sub> ) from the atmosphere and effectively trap it in their tissues and release oxygen (O <sub>2</sub> ) in return.
	Water storage and regulation (Groundwater recharge)	Patches of old fallow forest and plantations; river.	The presence of plant cover on the site favours the infiltration of rainwater and thus the recharge of the water table. Forest islands are reliable sources of water quality regulation.
	Soil fertility regulation	Plantations; old fallow land; forest patches.	Vegetation cover prevents soil erosion and improves soil fertility through natural biological processes such as nitrogen fixation. The decomposition of dead leaves into organic matter also contributes to soil enrichment and the proper germination of certain plants.
	Erosion Control	Plantations; old fallow land; islands of forest and pineapple field	The presence of vegetation cover does not promote the transport of soil particles by runoff water
	Pollination	Plantations; old fallow land; forest and field islands	The existence of habitat for pollinators promotes their presence in the environment. Insects, birds and wind pollinating trees and other plants play a fundamental role in the development of fruits, vegetables and seeds.

Ecosystem Services Group	Ecosystem Services	Location	Positive impacts of ecosystem services
	Biological control of pests and diseases	Plantations; old fallow land; forest islands	Plantations, patches of forest, and old fallows provide habitat for likely predators of crop pests. These predators contribute to the control of pest populations and potential disease vectors.
Socio-cultural services (Non-material inputs)	Spiritual value	Sacred Forest	Sacred forests indicate the cultural identity and spiritual well-being of local residents.
	Aesthetic quality	Whole landscape	The presence of flora and fauna creates an aesthetic landscape.

## 6.5.7. Socio-community services

### 6.5.7.1. Community health

Data on the community health and the health infrastructures in the study area were collected through the PDC and monographs of Tori-Bossito and Ze municipalities. A visit to the 2 health centres of Tori-Cada and Tangbo-Djevie allowed to gather more accurate and detailed data.

#### 6.5.7.1.1. Health profile

In both Tori-Cada and Tangbo-Djevie, PDC data indicate that the main diseases encountered are malaria, respiratory diseases (cough), gastrointestinal diseases (parasitosis, typhoid fever), urogenital diseases, cardiovascular diseases, dermatological diseases and sickle cell disease. Bilharzia, lymphatic filariasis causing elephantiasis and Buruli ulcer (2 of the neglected tropical diseases) have also been reported by Tangbo-Djevie health centre. Tuberculosis is present but not widespread.

Malaria is by far the most common affections in the villages of the study area and in Ze and Tori-Bossito municipalities, with cases on the rise each year. District health authorities point behaviors as the main cause (refusal to sleep under mosquito nets, a disrespect for sanitary rules).

Other diseases reported in the villages and the district health centres include respiratory diseases (cough and flu), intestinal parasitosis causing dhiarroe (linked to a lack of potable water and consumption of river water), hypertension (caused by excessive consumption of alcohol and drugs), dysentery and traumas (due to road accidents especially because of the presence of RNIE 2 or farm work accidents). Liver diseases, diabetes, scabies and measles are also present.

According to health authorities interviewed, the main diseases by age groups are as below:

- **Infants:** malaria, cough, vomiting and dhiarroe.
- **Children:** malaria, cough, vomiting, dhiarroe, dog bites.
- **Women:** pelvic aches, cyst, painful menstruations. Women in focus-groups also declared suffering from kidney and joint aches. They mostly give birth at the local health centre which reduces child and mother mortality.
- **Youth:** asthma, malaria, tension, haemorrhoids.
- **Elderly:** tension, diabetes, arthrosis, prostate affection, glaucoma.

Health centres mention a widespread dependency on alcohol consumption and consumption of tobacco and drugs among men.

Villagers in the study area declared they benefited from vaccination campaigns against polio as well as distribution of impregnated mosquito nets (Agbodjedo village). District health centres confirmed there are regular vaccination campaigns and malaria, HIV/Aids or elephantiasis awareness-raising campaigns.

At the national level, the HIV/AIDS prevalence rate is 1%, but women are more severely affected (1.3%) than men (0.8%) according to UNAIDS (2018). In the study area, HIV/Aids were not mentioned as a prevalent condition. Health centres mention it as present along with other sexually transmitted diseases such as gonorrhoea. The persons interviewed know about the disease and how to protect themselves from it.

#### 6.5.7.1.2. Food security

The table below presents an insight on the type of products consumed in the study area. Households produce most food items that they consume.

**Table 38 Food items**

Food categories	Items	Origin
Sauce	Ladyfinger, tomatoes, palm seed ( <i>sauce graine</i> ), cassava leaves, <i>Irvingia gabonensis</i>	Household production
Meal	Corn paste, cassava fermented paste ( <i>gari</i> )	Household production
Tubers	Cassava, sweet potatoes, yam	Household production
Fruits	Pineapple, mangoes, papaya, banana, avocado, watermelon, orange	Household production
Meat	Chicken, rabbit, duck, partridge	Household production

(Source: ANTEA, November 2019)

According to district health centres, the nutrition pattern in the study area is unbalanced. Villagers consume mostly corn paste and palm seed sauce which are both poor in nutrients and proteins causing nutritional deficiency with occasional cases of *Kwashiorkor* among children.

Women reported during the focus-groups that food shortages were rare in the area but could happen under some exceptional climatic conditions. Families always find ways to feed themselves because they are engaged in farming activities and can consume their own production or food reserves. They can also rely on parents living in other areas or abroad. However, in food shortage conditions, households will consume the share of agricultural products they ought to sell to get cash incomes, which leads to a shortage of cash and an incapacity to pay for spending such as health or education.

#### 6.5.7.1.3. Existing health infrastructures

The health system in Benin is pyramidal and based on the administrative organisation of the country with:

- Village health units
- District health centres
- Municipalities health centres
- Department hospitals

Despite this organisation, there are no health infrastructures, either public or private, in the villages of the study area.

Existing health centres (HC) are located at the district level. The populations in the surrounding villages go to these HC for their health problems (care, prenatal visits, childbirth). The distance between them and the villages varies from one village to another but mostly, villagers must walk around 6 km (2 hours) to reach the district health centres.

The map below locates these health centres along with other public infrastructures.

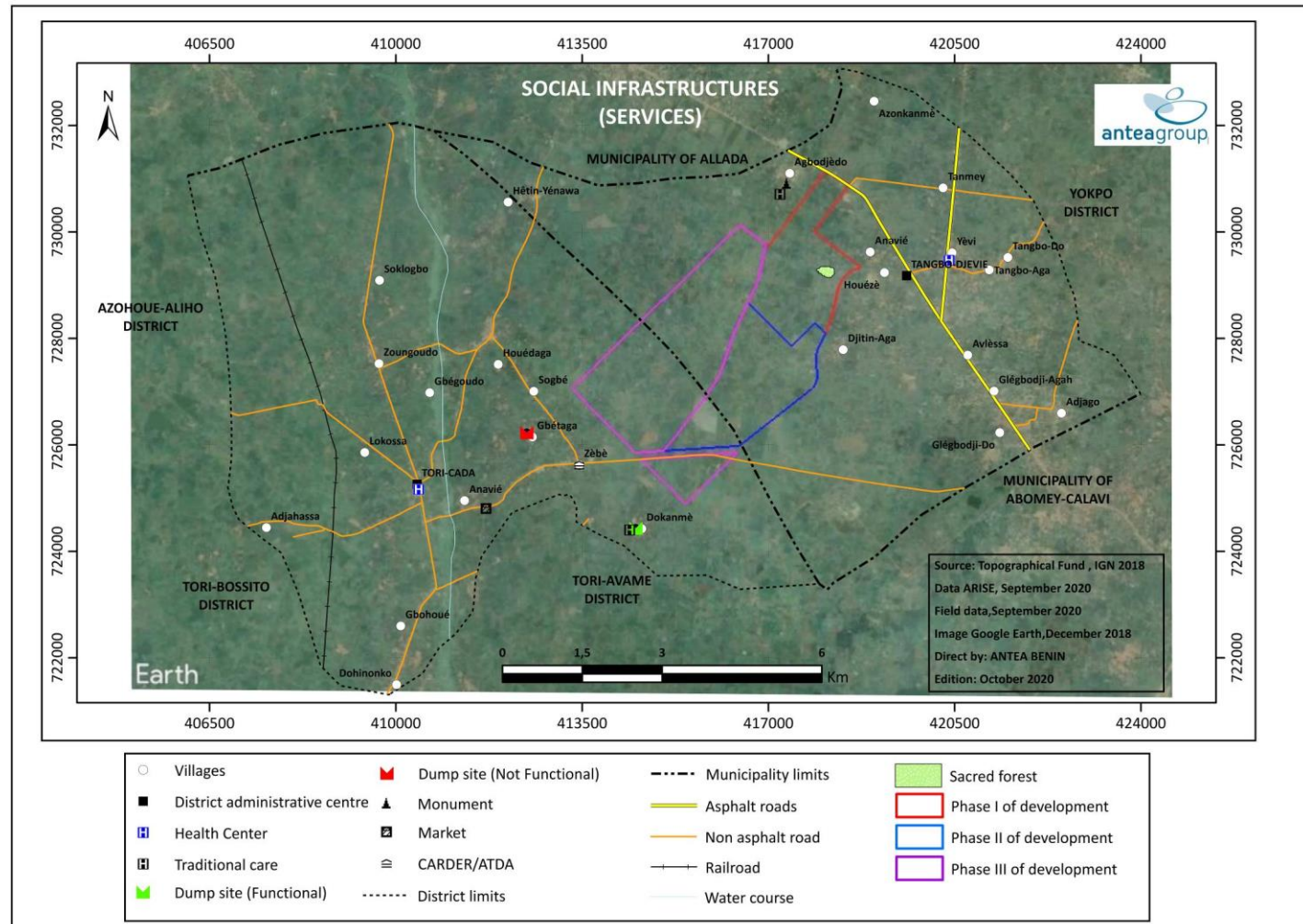


Figure 89 : Location of health infrastructures in the study area



Tori-Bossito has one communal health centre and 5 district health centres (DHC).

The inhabitants of the villages impacted by the Project usually seek treatment at the DHC of Tori-Cada. Tori-Cada also counts one isolated dispensary and 4 private medical practices, one private clinic (GEDESA) which provides nursing and obstetric care and a pharmacy. The nearest hospital is the Ouidah-Kpomasse-Tori-Bossito zone hospital located in Ouidah.

Ze has one communal health centre and 9 DHC. The municipality HC does not yet offer a good quality of services due to a lack of infrastructures material and pharmaceutical equipment. The DHC roles are to provide preventive and curative care along with minor surgery. There are also numerous illegal health practitioners in the municipality which are progressively closing due to changes in the law. Due to the poor condition of public health infrastructure, a chronic lack of equipment (particularly ambulances to transport sick patients) and personnel and to the closure of private practices, health services are becoming increasingly out of reach for the inhabitants of Ze municipality.

Inhabitants of the villages impacted by the Project will seek treatment at the Tangbo-Djevie DHC, which is their closest HC. Ze also has a zone hospital for Allada-Toffo-Ze in Allada.

The table below presents a summary of the main characteristics of Tori-Cada and Tangbo-Djevie DHC.

**Table 39 Characteristics of Tori-Cada and Tangbo-Djevie DHC**

Category	Tori-Cada DHC	Tangbo-Djevie DHC
<b>Personnel</b>	9 1 nurse, 1 midwife, 2 pharmacists, 4 assistant nurses, 1 cashier	13 3 nurses, 3 midwives, 3 pharmacists, 3 assistant nurses, 1 cashier
<b>Number of beds</b>	11	11
<b>Type of care provided</b>	Obstetric Malaria treatment Treatment for main diseases of the area Emergencies (not requiring surgery)	Obstetric Malaria treatment Treatment for main diseases of the area Emergencies
<b>Type of care NOT provided</b>	Surgery HIV/Aids	Surgery HIV/Aids
<b>Access</b>	Poor road condition Inaccessible in rainy days	Poor road condition Inaccessible in rainy days for some villages
<b>Main issues</b>	Lack of electricity Lack of specific material	Lack of specific material
<b>Price of consultation</b>	400 FCFA	400 FCFA

(Source: ANTEA, August 2020)

The Tori-Cada HC reports that its buildings are in rather good condition, that most basic material is available and that medicine supplies are enough. The Tangbo-Djevie HC underlines that its buildings are dilapidated and require refurbishment.

In the affected villages, families frequently resort to medicinal plants whose virtues they know. In addition, there are traditional healers who also have knowledge about certain diseases. These healers intervene in a context where the belief in witchcraft remains very present and where it is questioned in case of illness of unknown origins. Villagers usually refer to traditional healers first, but when they are not able to treat the patient, they tend to refer him to the district health centres. There is indeed a collaboration between the 2 forms of medicine, especially because district health personnel raise

awareness of traditional healers on the need to refer immediately to them some patients (such as those suffering from malaria).

### 6.5.7.2. Education and vocational training

There is a school that combines kindergarten and primary school in almost each impacted village apart for Gbetaga. The table below provides detailed information on these schools, along with a map locating these infrastructures.

**Table 40 Primary education infrastructures in the villages of the study area**

District	Village	Name of the infrastructure	Levels	Number of students	Number of teachers	Number of classrooms	Toilets
Tangbo-Djevie	Agbodjedo	Public primary school of Agbodjedo	Kindergarten Primary	-	-	-	Yes
	Anavie	Public primary school of Anavie	Primary	431 216 girls 215 boys	6	3 in good condition 3 without roof	Yes
		Public secondary school of Anavie	Secondary	1,314 615 girls 699 boys	57	29	Yes + 1 water point
		Kindergarten	Kindergarten	-	-	-	-
	Djitin-Aga	Public primary school of Djitin-Aga	Primary	76 28 girls 48 boys	2	1	No
	Houeze	Public primary school of Houeze	Primary	457 208 girls 267 boys	7	6	Yes + 1 water point
		Private school God is good	Primary	275 127 girls 148 boys	6	6	Yes + 1 water point
Tori-Cada	Dokanme	Public primary school of Dokanme	Kindergarten Primary	198 (K) 55 (P)	2 4	2 4	Yes
	Sogbe	Public primary school of Sogbe	Primary	-	6	6	Yes
		Kindergarten of Sogbe	Kindergarten	-	1	1	No
	Zebe	Public primary school of Zebe	Kindergarten Primary	500	8	12	Yes

(Source: ANTEA, November 2019 and August 2020)

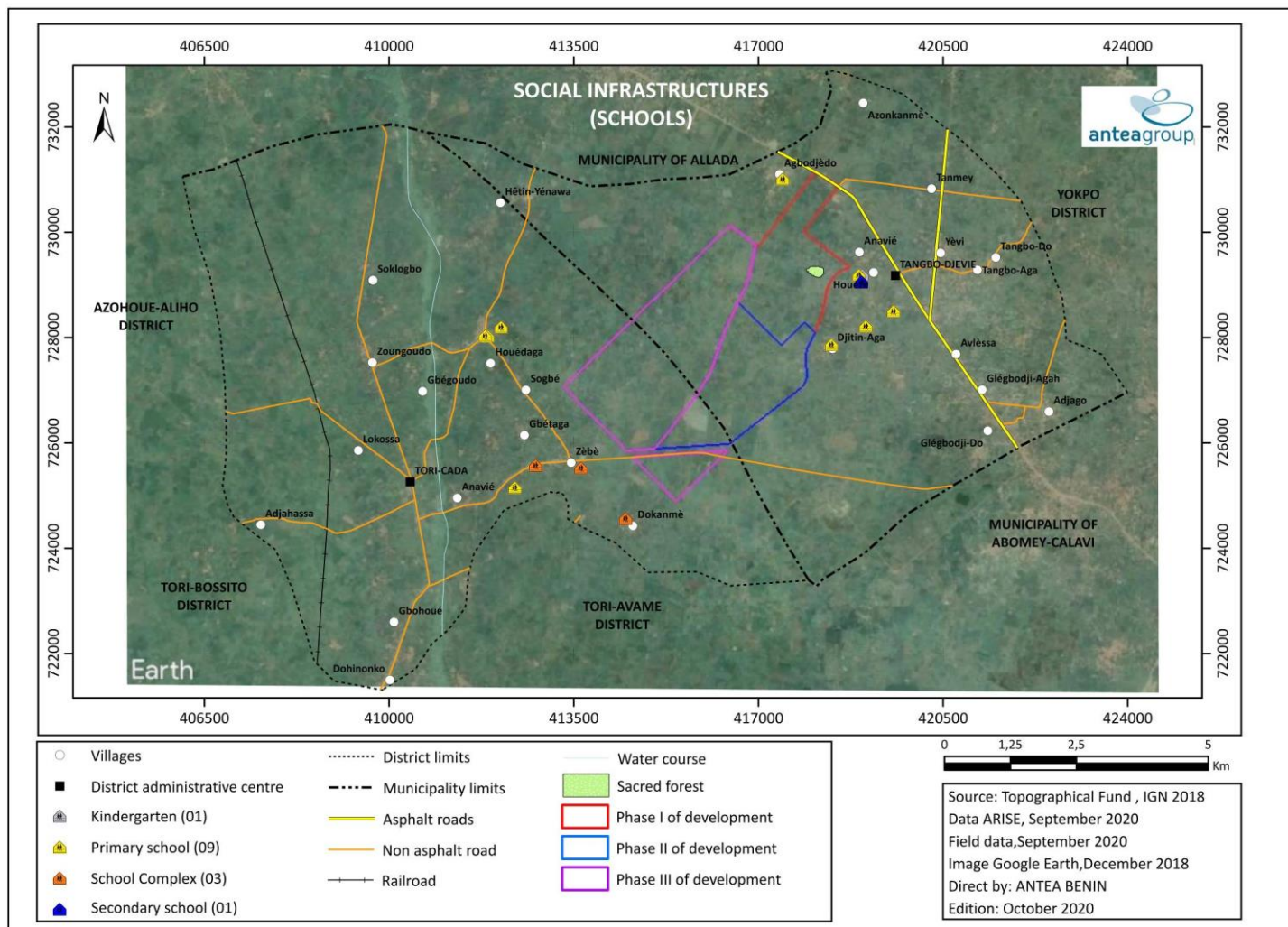


Figure 90 : Location of education infrastructures in the study area

In these schools, there is a shortage of educational staff but also of teaching materials, especially in kindergartens. In classrooms made in all old buildings, there is a lack of tables and benches, which leads to the observation of children sitting on bricks with sometimes nearly 10 pupils sharing a table designed for 3 or 4 pupils. Classrooms are overcrowded. Most of these schools are made up of 4 classrooms, which points to the twinning of the CE1 and CE2 classes as well as the CM1 and CM2 classes. The same is true for kindergarten classes. Most schools have toilets for their students but suffer from a lack of water points.

Overall, the local education system suffers from high drop out rates, lack of teachers and overpopulated classrooms.

The pictures below show some schools in the study area.



(Source: Antea, November 2019)

**Figure 91 : Primary school of Djitin-Aga on the left and primary school of Houeze on the right**



**Primary school of Dokanme**

**Primary school of Sogbe**

(Source: Antea, November 2019)

**Figure 92 : Infrastructures and equipment bordering the site**

In terms of secondary education, the PDC underlines that:

- Ze municipality counts 10 public secondary schools along with some private schools. There is one of them in Tangbo-Djevie district which gathered 1,298 pupils in 2019, 605 girls and 693 boys.



- Tori-Bossito has 8 public secondary schools. One of them is located in Tori-Cada district. There are also numerous private secondary schools mostly located in Tori-Bossito District.
- In terms of vocational training, there are no institutions in Tori-Bossito while in Ze, the offer for vocational training centres is almost inexistent apart from the Centre for professional training set up by the Foundation Follereau Luxemburg, which aims at offering training to out of school children, orphans and other vulnerable children.

#### **6.5.7.3. Access to water, hygiene and sanitation**

The population of the study area uses several water sources to meet multiple needs:

- rainwater is used in household activities (washing, toilet, cooking and laundry). It is also the main source of water for agriculture;
- groundwater is mainly used for drinking and watering market garden crops. Groundwater is drunk without prior treatment;
- water imported by tanker trucks and sold to residents by private contractors;
- surface water from inexhaustible rivers.

The map below locates most of the water sources (private or collective and functional or non-functional) in the study area.



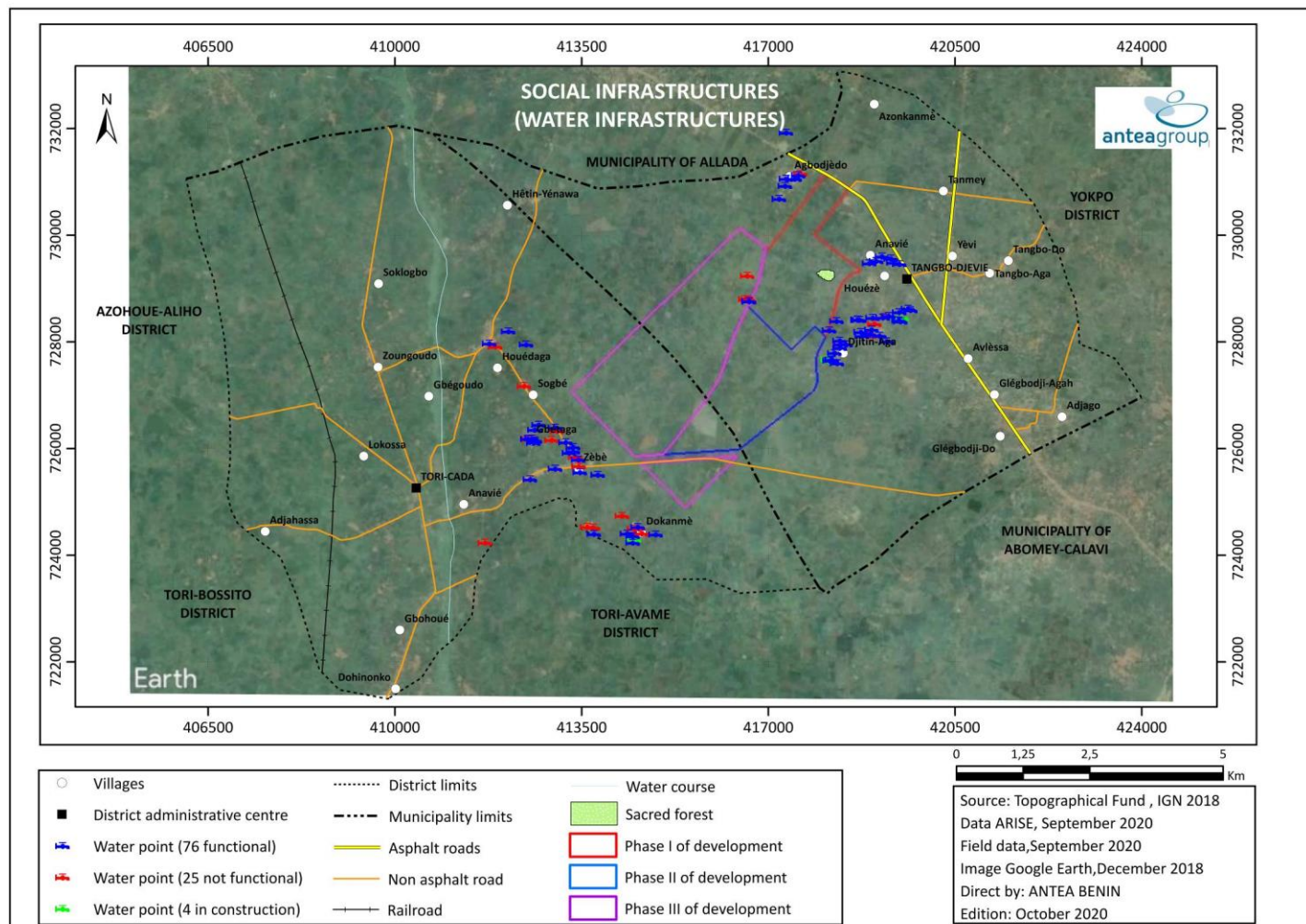


Figure 93 : Location of education infrastructures in the study area

Despite these multiple water sources and the abundance of water in the study area, access to water differs between Ze and Tori-Bossito municipalities.

#### 6.5.7.3.1. Situation in Tori-Bossito

The populations of the municipality of Tori-Bossito are supplied with drinking water by the SONEB water supply network, village water supply systems (boreholes and standpipes), cisterns, wells and rivers. The municipality's drinking water coverage is 43%. This rate hides the difficulties of access to drinking water for the population, especially rural populations. Indeed, the quality of water in cisterns, rivers and wells is questionable. The SONEB water supply network is limited to the chief town of the municipality and certain districts of the district of Tori-Gare. Efforts remain to be made regarding access to drinking water for the populations of the Tori-Cada district.

Indeed, populations in this area benefit mainly from public hydraulic services through autonomous boreholes and standpipes. At these boreholes, water costs 25 FCFA/20 litres of water. However, these hydraulic works are unevenly distributed throughout the villages of the study area, and some are not functional anymore, as underlined in the table below.

**Table 41 Water infrastructures in the villages of Tori-Cada district**

Village	Number of public boreholes	Current condition
Dokanme	1	Under construction, not functional yet
Gbetaga	0	Public boreholes that existed not functional anymore
Sogbe	1	Functional during one season only with a weak flow
Zebe	1	Not functional

(Source: ANTEA, November 2019 and August 2020)

As the municipality is the manager of these water points, the populations are waiting for its intervention to be able to use them again. In the meantime, they get their supplies from private individuals who have cisterns or private boreholes for their water needs (50 to 75 FCFA/ 20 litres of water depending on the price of oil).

Villagers complain from the lack of water points, the distance of water points from there village (sometime 500 to 800 meters), the long queuing to get water, the dysfunctional equipment and the cost of water from private boreholes. There is therefore an important issue of access to water at the level of these villages.

#### 6.5.7.3.2. Situation in Ze

In Ze, in the district of Tangbo-Djevie, there are several public and private water supply infrastructures. The coverage of water points seems to be sufficient since the populations of the villages of the study area indicate that they do not have problems to access water.

Villagers rely equally on private boreholes and wells than on public infrastructures that are not always functional or under construction.



(Source: Antea, November 2019)

**Figure 94 : Water facility in the villages of the study area**

The table below provides a detail on the number of public boreholes in these villages. These boreholes are also managed by the municipality and water costs 25 FCFA/20 liters.

**Table 42 Water infrastructures in the villages of the Tangbo-Djevie district**

Village	Number of public boreholes	Current condition
Agbodjedo	1	Not functional
Anavie	3	2 functional all year but low flow 1 under construction
Djitin-Aga	2	1 not functional 1 working with low flow except when outbreaks occur
Houeze	3	All under construction

(Source: ANTEA, November 2019 and August 2020)

#### 6.5.7.3.3. Sanitation practices

In the villages of the study area, there are no public toilets except in schools. Villagers usually defecate in their individual traditional toilets, in the bush or in dug-out holes. They throw their garbage in their surrounding environment or in unauthorized dumps.

Neither Ze nor Tori-Bossito municipalities have a solid waste management system in place.

At the municipalities level, the hygiene and sanitation problem are acute and are displayed, according to the PDCs, as follows:

- the presence of sewage around roads and settlements due to the fact that sewage is disposed of at the individual household level;
- the presence of household waste in the vicinity of roads and settlements with unauthorized dumps due to the absence of an efficient system of collection, treatment and management of this waste in the municipality;
- the periodic flooding with the ensuing insalubrity of the roadsides in certain district capitals of the municipality due to the virtual non-existence of sanitation works (gutters for the evacuation of sewage and rainwater);
- the virtual non-existence of public and private family latrines in all the districts with the consequences of environmental pollution by faeces and insalubrity in the municipality;

- the non-use of good hygiene practices, in particular (i) the systematic non-washing of hands before and after food and after contact with faeces, the non-protection of foodstuffs, cohabitation with animals, solid waste, and waste water;
- the non-certification of the quality of water delivered to the population by private actors;
- the poor layout of latrines compared to household drinking water wells.

#### 6.5.7.4. Access to energy

Regarding access to electricity, the *Société Béninoise d'Énergie Électrique* (SBEE) is the only structure authorized to provide electrical energy in the municipality of Tori-Bossito. It serves only a small part of the capitals of the districts of Tori-Bossito, Tori-Gare and Azohoue-Aliho in the municipality. In the district of Tori-Cada, the network extends from Tori-Gare to the village of Dohinonko (Tori-Cada) without really benefiting the population. It is important to point out that the electrical network coverage is not uniform and that within the urban area of the municipality there are still areas waiting to be electrified. A large part of the population still uses lanterns and lanterns to light their homes.

Some villages are still waiting for their connection to the SBEE network and for public lighting in their localities. The problem of electrification of the municipality and in particular that of rural areas remains entirely unresolved. It is therefore necessary to seek appropriate and better adapted solutions for the electrification of the municipality. Remarkable efforts have been made by the Government and have resulted in the installation of a few solar panels in the municipality. Solar-powered domestic electrification initiatives exist in the municipality.

In Ze municipality, only 3 chief towns are connected to the SBEE network.

The 8 villages impacted by the Project in the districts of Tori-Cada and Tangbo-Djevie are not electrified. They use solar panels, generators or torches for their energy needs. Wood from the forest and charcoal are mainly used for cooking.

#### 6.5.7.5. Transport and communications

##### 6.5.7.5.1. Communication

In the field of telephone communication, we note the low extension of the wired telephone network. The only telephone contacts today are possible through GSM networks.

In the villages of Dokanme, Zebe, Gbetaga and Sogbe (Tori-Bossito) impacted by the Project, communication via the Moov and MTN telephone networks is very risky and the Internet is practically non-existent.

In Ze, all the districts are covered by the country's 2 main networks, MTN and Moov. However, the coverage of the municipality by these cellular telephone networks is only partial, with the corollary of difficulties in connecting to the Internet.

In terms of radio communication, we note the existence of "Kpasse Radio" and "Alliance FM", which broadcast from neighbouring municipalities, as well as the National Radio and Television Office (ORTB) covering the entire study area. The populations of both Ze and Tori-Bossito manage to receive most of the radio stations, whether local, national or international. They also listen to the radio "Voice of the Lama".

The municipality of Ze is fully covered by the national radio and television (ORTB) as well as the private televisions CANAL 3, Golf TV, Iden TV and local radios (Diaspora TV, Voice of the Valley, etc.).



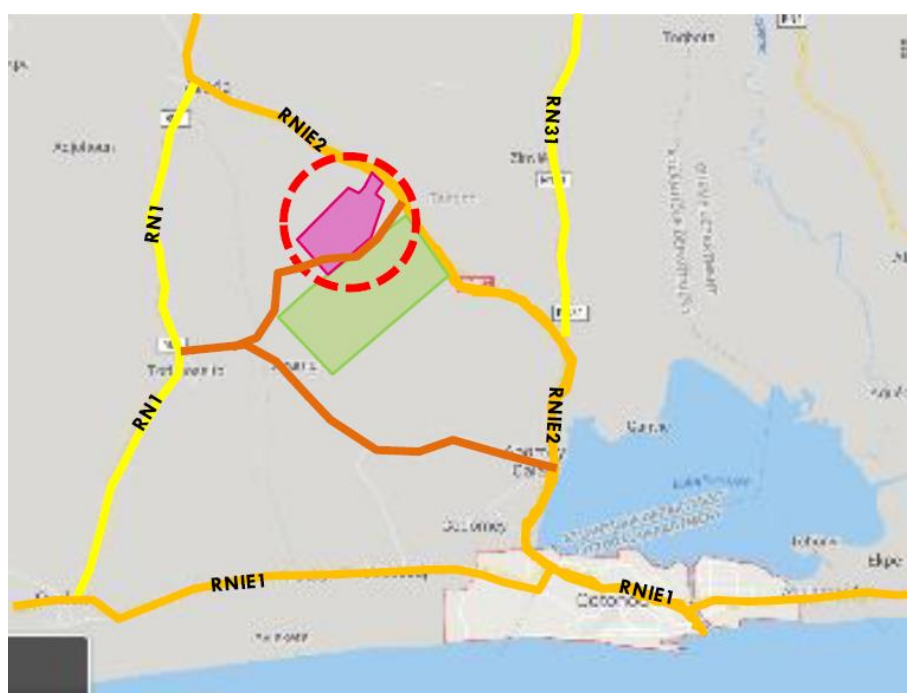
The information deficit of social actors is significant, and word of mouth or town criers remain an important source of information for villagers.

#### 6.5.7.5.2. Vehicles and road network

Villagers use mostly moto-taxis (called *Zemidjan*), private motorbikes, tricycles and car taxis to travel around.

Regarding the road network, the Project area is bordered by 2 asphalt roads:

- the asphalted national interstate road (RNIE 2) linking Abomey-Calavi, Ze and Allada, which runs along the eastern part of the Project site and through which access to the main industrial zone will be provided;
- the asphalt road linking Allada to Tori-Bossito and then Ouidah.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Figure 95 Location of Proposed GDIZ along the existing and planned road network**

Inland, the villages are served by rural laterite feeder roads that connect the districts and villages. These tracks are numerous, but many are very narrow, sandy and strewn with crevices. As a result of the condition of these tracks, several localities in the municipality of Tori-Bossito (including the villages in the study area located there) are landlocked due to the poor condition of the tracks. Traffic is particularly difficult during the rainy season.

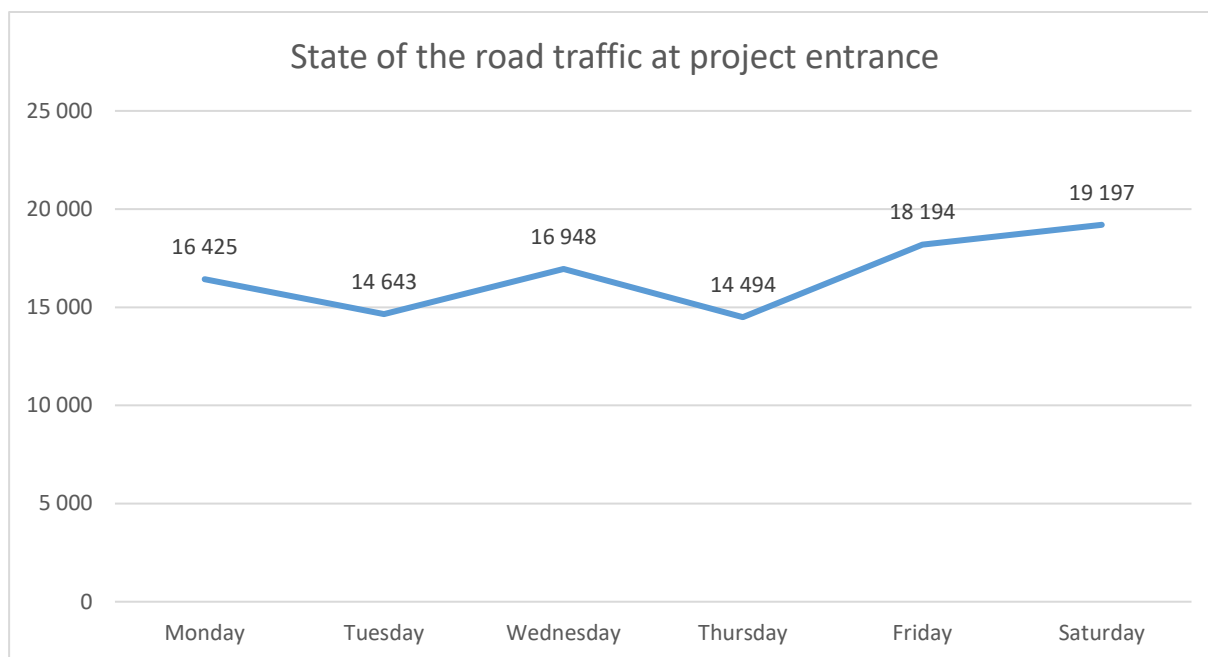
The intermunicipal roads are occasionally maintained by the departmental road maintenance service.

#### 6.5.7.5.3. Traffic conditions

A traffic survey at the Project entrance level was conducted for a week, from 19/08/2020 up to 25/08/2020.

This survey highlighted that the traffic reached 116,640 vehicles a week, with an average of 16,663 vehicles per day, a maximum of traffic on Saturday and a minimum on Thursday, as shown in the graph below.

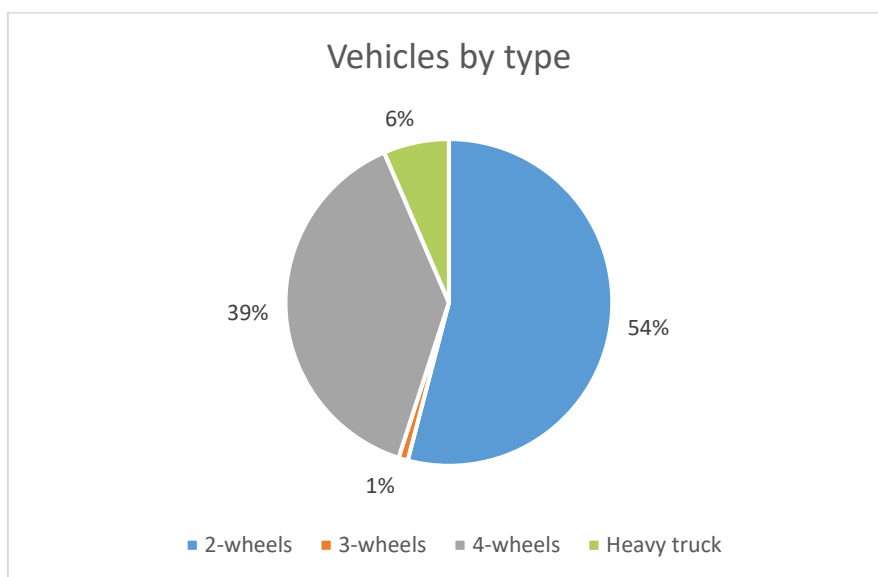




**Figure 96 : State of the road traffic at Project entrance**

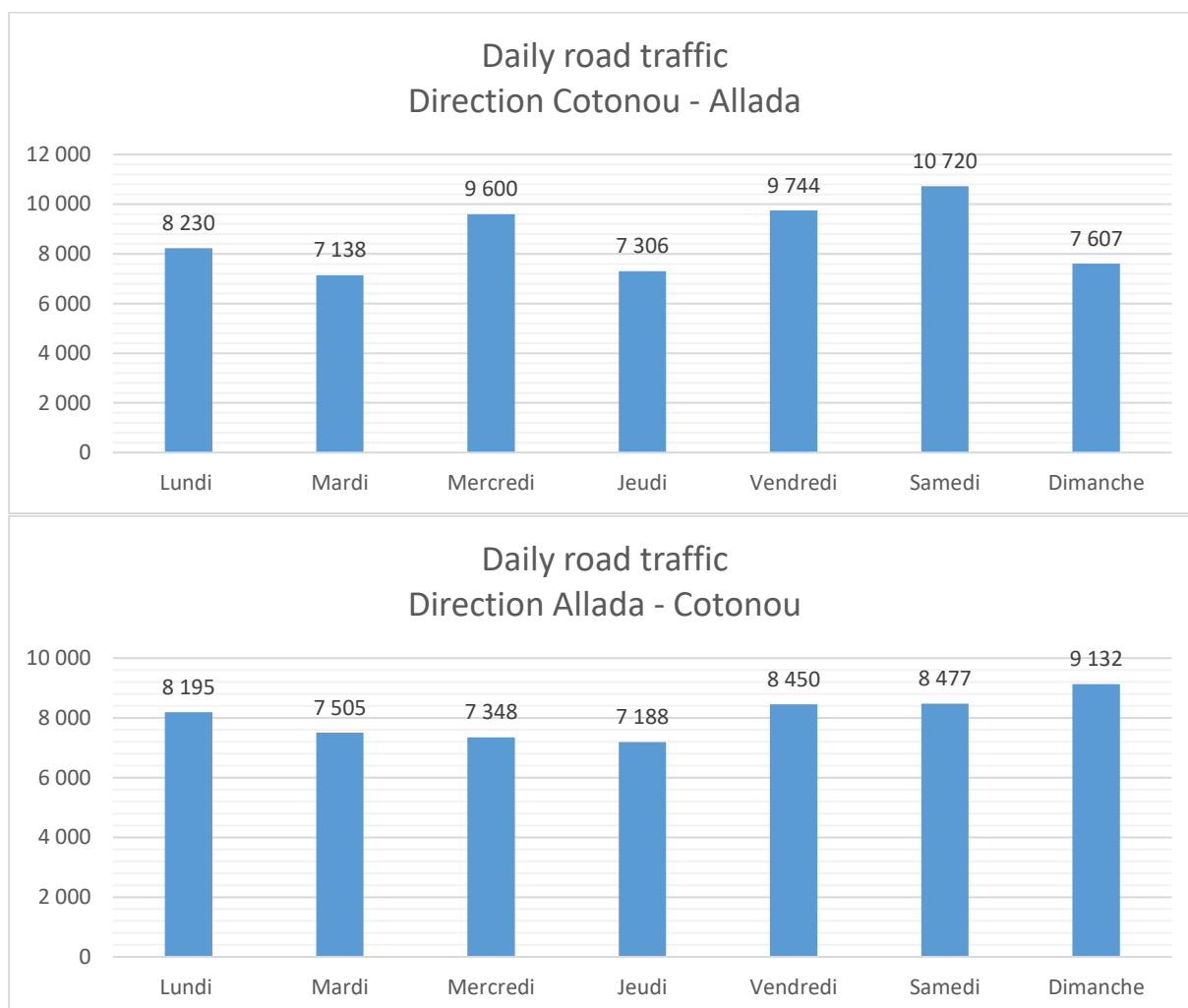
The traffic is slightly more important in the direction Cotonou – Allada (60,345 vehicles) than in the direction Allada – Cotonou (56,295 vehicles).

As highlighted in the graph below, vehicles passing in front of the site entrance are mainly two-wheels (54% of traffic), followed by cars (39%) and in a lesser extent by heavy trucks which represent only 6% of the traffic.



**Figure 97 : Road traffic, vehicles by type**

The graph below shows the daily traffic intensity in both directions. Days with the highest level of traffic are Saturday for the direction Cotonou – Allada and Sunday for Allada – Cotonou.



**Figure 98 : Daily road traffic in both directions**

With regards to traffic time windows, it appears as shown in the graphs below, that in the direction Cotonou – Allada, the traffic progressively increases from 6 to 9 AM to remain stable until 8 PM, whereas in the direction Allada – Cotonou, traffic increases all day long to reach its peak between 6 and 7 PM.

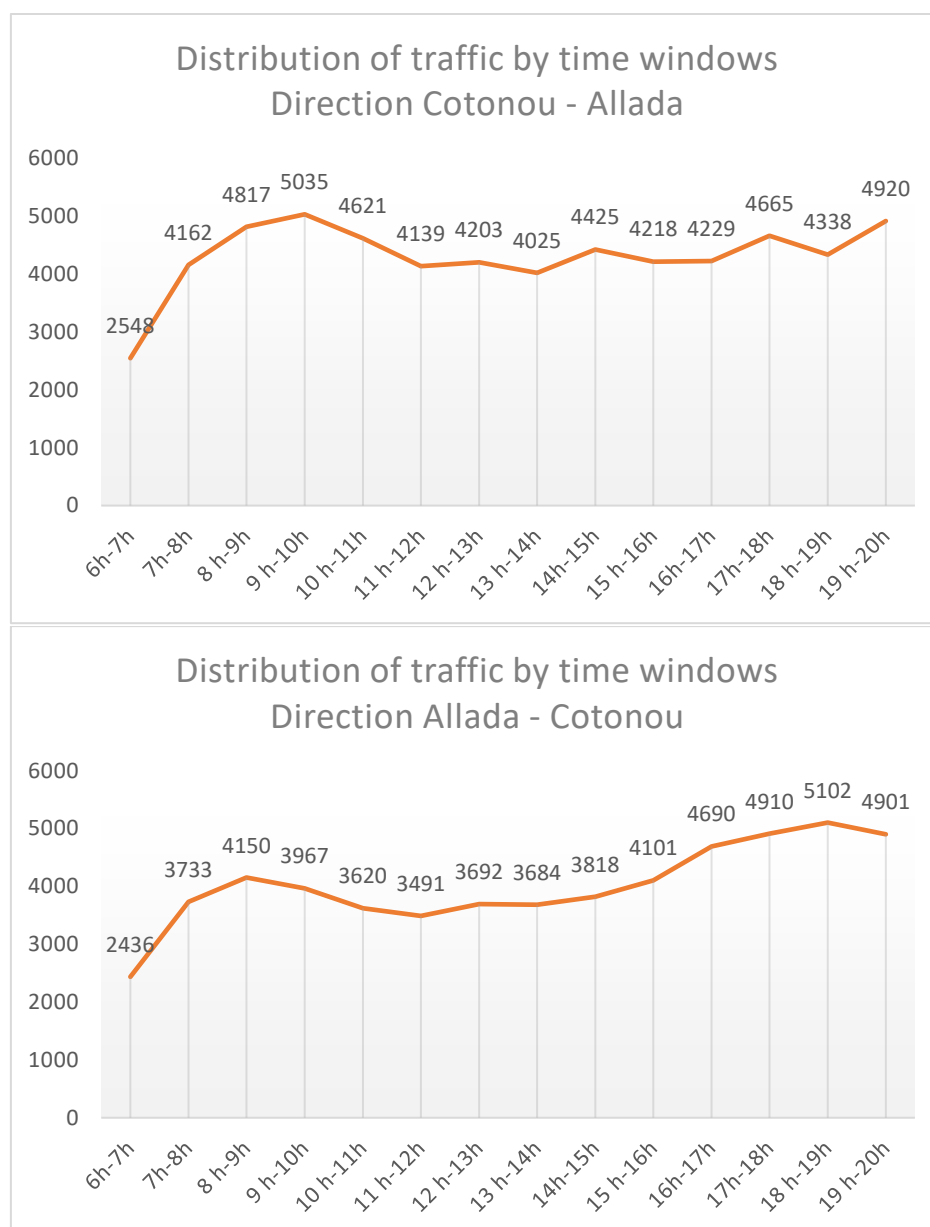


Figure 99 : Road traffic by time windows in both directions

#### 6.5.7.6. Sport and leisure infrastructures

Sports, cultural and leisure activities are poorly developed in the Ze municipality despite the demographic weight of young people and their strong mobilization around sports activities, especially football. Tangbo-Djevie district does not have public leisure infrastructures but some villages have self-prepared pitch (Anavie, Houeze and Djitin-Aga villages).

In Tori-Bossito equally, there are no public sport infrastructures and youths play football on self-prepared pitches. There are occasionally youth centres which are not always in good condition or fully used.

#### 6.5.7.7. Solidarity and mutual aid

In the study area, solidarity and mutual aid systems are well developed and very active. They rest on several levels:

- Dynamic local associations at the village level.
- Social services provided by the State.
- Intervention of national and international NGOs on specific issues.

In the 8 affected villages, there are self-help groups as well as village organizations working in specific areas mostly related to women mutual aid and crop farming. In almost each village, there are at least a woman saving association, a farmer's association and a pineapple growers association. This underlines the capacity of local villagers to organize to defend their rights or improve their living conditions.

These groups include in Tangbo-Djevie:

- Women's association: Missimide, Mahugnon, Gbenonkpo, yelinhan, Medelinhan, WABA;
- Association of Young and Old People: AJASDM (Ananvie Youth Association concerned about a better tomorrow), Association of Young Pineapple Growers, Village pineapple producer cooperative (CVPA), Cooperatives of agricultural service providers;
- Farmer's associations and cooperatives: AisSogbe, Alafia.

And in Tori-Cada:

- Association of women WABA, DOUKPO
- Association of farmers: ADOKPE, AïDOTE
- Associations of young: Assembly of young people and young leaders for the development of the municipality, DOUDEDJI
- Association of young and old of both sexes: COOPERATIVE GLEDOLE
- Associations of craftsmen (JESOUKPEGO) artist associations (CADEC-TB)

The presence of this associative fabric encourages cooperation and mutual aid between local residents. A lack of collective sport infrastructure however hinders social cohesion among youngsters.

Several social services are available to the population in the study area. In Tori-Bossito are listed:

- a Centre for the Reception and Protection of Children;
- a Center for Social Promotion;
- a functional communal committee for the protection of the rights of children, handicapped persons and senior citizens;
- a NGO for the pre-collection of household waste.

As seen in § 6.5.3.3, the municipality of Ze has 4 orphanages and reception centres that help the municipal authorities to better manage the situation of vulnerable groups.

Although several NGOs intervene at the municipality level of Tori-Bossito and Ze, only a few villages in the study area benefited directly from their programs such as:

- Anavie which received support from CEBEDES and Peace NGOs in the fields of school building, support to vulnerable groups and orphans and nutrition.

- Djitin-Aga which received support from CEBEDES, DEDRAS, UNICEF in the fieldsof childcare, nutrition and agriculture.
- Houeze received support from CEBEDES (child care and nutrition).

Other NGOs work in the area to support more specifically vulnerable groups, as underlined in § 6.5.3.3.2.

## 6.6. Environmental and social sensitivities in the Project area

The development of GDIZ will result in impacts that, when they occur, will be more or less intense depending on the initial state of the physical, biological and human components of the study area.

In order to better assess these impacts, it is therefore necessary to identify the sensitivity of these components and to rate them following a set of standards detailed in § 7.1.2. The table below meets this objective.

Table 43 : Sensitivities of the study area

Theme	Description	Sensitivity
<b>Physical environment</b>		
Climate and air quality	<p>The study area is marked by a sub-equatorial climate characterized by 4 seasons, including a major rainy season from April to July and a major dry season from December to March. The average annual rainfall is about 1,200 mm and average monthly temperatures vary between 27 and 31 degrees Celsius.</p> <p>The average sunshine is 5.14 Kw/m2/day and the winds are characterized by the occurrence of a strong wind in the dry season and at the end of the rainy season.</p> <p>The study area is largely rural, characterized by low-intensity agricultural activities and limited road traffic. There are no industrial or agricultural activities that could potentially degrade air quality and noise levels.</p> <p>Only road traffic on the RNIE 2 bordering the site can be a source of air pollution. Road traffic on the secondary roads remains extremely low and is restricted to small agricultural machinery, so pollution in their immediate environment is very low</p>	
Hydrology and hydrogeology	<p>The hydrographic network in the Study Area is poorly developed since no watercourse crosses it, both in rainy and dry season. Even if the central depression gathered superficial runoff, the large infiltration capacity of the area reduces the presence of superficial flow.</p> <p>The nearest river (Lama depression) is about 2.5 km from the eastern boundary of the Project site and flows into the Cotonou lagoon system. The site has no ponds, swamps or other natural or artificial water reservoirs.</p> <p>The hydrogeological characteristics of the study area are not known, in the absence of previous studies or piezometers placed in situ. Groundwater mobilization is effective, however, since there are several hydraulic structures in the study area.</p> <p>The sources of surface and groundwater pollution are mainly anthropogenic (use of pesticides and poor hygiene and sanitation practices).</p>	
Geology, topography and soils	<p>The Study Area has a slight north-south tilt towards the Lama Depression located to the southeast of the Project Area. The soils are essentially ferrallitic depleted on soft clayey-sandy sediment of the terminal continental.</p>	



Theme	Description	Sensitivity
Landscape	The landscape of the study area is characterized by mosaics of fields and fallow land. The landscape interest of the site is low due to the anthropized nature of the site, the absence of panoramic viewpoints or natural sites of tourist interest (lakes, waterfalls, etc.). The Project site does not have a unique or remarkable landscape character.	
<b>Biological environment</b>		
Protected Areas	No form of protected area is present on the Project site. The closest protected area is the Ouedo classified forest located about 10 km south of the Project site.	
Habitat and flora	<p>The vegetation cover of the study area is largely anthropized and no longer presents large forested areas with preserved natural vegetation. It is characterized by mosaics of fields and fallow land with crops such as pineapple (<i>Ananas comosus</i>), maize (<i>Zea mays</i>), cassava (<i>Manihot esculenta</i>) and oil palm (<i>Elaeis guineensis</i>) plantations. Numerous invasive species have colonized the area and compete with the indigenous flora.</p> <p>Shrubby vegetation marks the edges of the fields with the scattered presence of large notable trees (sacred forest)</p> <p>In some places there are still relics of degraded but recovering natural vegetation. These include open forests and semi-deciduous dense forests dominated by <i>Albizia zygia</i>.</p> <p>No watercourse was observed, and no typical vegetation of wetland was found in the depression during investigations, both in rainy and dry season.</p> <p>Of the 156 plant species identified, 45 are protected by law and 2 are <i>Khaya senegalensis</i> and <i>Pouteria alnifolia</i> have LC status in the IUCN red list and 3 <i>Khaya senegalensis</i>, <i>Milicia excelsa</i>, <i>Triplochiton scleroxylon</i> have EN status in the beninese red list.</p>	
Fauna	<p>Due to its permanent human occupation, the Project area is not very rich in large mammals. The species that have been identified include small mammals, rodents and lagomorphs. Few of them are protected by law and have an IUCN status but not higher than LC.</p> <p>Regarding birds, of the 60 recorded species, 2 are protected by law and have a LC status in IUCN red list. Some are known to nest on site, and one, the Double-spurred Francolin, is a ground-nesting bird.</p> <p>Other families such as butterflies and insects, amphibians or reptiles are also present, but of these, none of the species has a vulnerable status according to IUCN. One reptile species, the Seba Python, is protected by law.</p>	
Ecosystem services	The populations of the study area use different natural materials present in their environment for the construction of their dwellings, combustion and traditional medicine. They also transform forest products into handicrafts such as basketry products (baskets, vans, mats, baskets) and agricultural tools.	
<b>Human Environment</b>		

Theme	Description	Sensitivity
Demographic balance including migration	<p>The 8 villages in the study area have a population of approximately 10,639 persons. The main ethnic groups are the Aizo and Tori, indigenous to the area. Seasonally, the Peulh herders cross the study area during the great transhumance that lasts from February to May. None of these groups are recognized as indigenous by the international community or the Government. The study area is marked by seasonal out-migrations in the dry season when agricultural activities are at a standstill, and permanent out-migrations that sees young people leaving their villages in search for job opportunities in urban areas or abroad. There is also a recent influx of new settlers composed of urban land buyers due to land speculation.</p> <p>The villages of the study area present a homogeneous ethnic and cultural composition, a demographic equilibrium with limited in or out-migrations, peaceful cohabitation between groups and welcoming views towards newcomers. They want to maintain this homogeneous setting by putting strong prohibition rules on access to women for foreigners to the community.</p>	
Women and gender issues	<p>Benin is categorized by the OECD as having a medium level of discrimination against women. While legislation is increasingly protective of women's rights (equality in inheritance, prohibition of levirate, polygamy and dowry, prohibition of violence against women), the persistence of customary law still prevents them from enjoying equal rights. In the study area, polygamy is still practised along with forced marriages, and women's political representation in local decision-making bodies remains low. Women cannot inherit from their fathers or husbands and are therefore excluded from customary land ownership. Women and young girl are also exposed to various forms of violence although these remain largely underreported.</p>	
Vulnerable groups	<p>The study area includes vulnerable persons in the following categories: persons with physical or mental disabilities, children under 14 years of age who are out of school, orphans, elderly, women-headed households and widows and poor households.</p> <p>Few of these groups benefit from social services offered by the local government or by private institutions. Most of them remain uncared for and must form associations to benefit from some sort of support.</p>	
Land tenure and land use	<p>The Project site is entirely fragmented and occupied by agricultural activities. Land tenure situation is complex, since customary land law (first occupier's right) and modern land law (land title) coexist. These 2 types of law are in permanent tension due to increasing land speculation in the area. This speculation has its origins in the peri-urbanisation of the area and the establishment of the Glo-Djigbe international airport, which has attracted investors looking for land to buy.</p> <p>On the same piece of land may therefore be an owner with a land title and an operator with a right of use. Two real estate developers have also carried out land parcelling and sale operations within the Project's footprint.</p> <p>Land speculation has led to increased land-related conflicts and deep changes into land management practices perturbing social organization and relationships between families, neighbours and individuals.</p>	

Theme	Description	Sensitivity
Employment, economic activities, livelihoods and local economy	<p>The primary livelihood source is agriculture, completed by domestic animal husbandry and hunting. It is a rain-fed subsistence crop farming but there is also a strong commercial agriculture, centred on a few key products such as pineapple or oil palm.</p> <p>Other economic activities are practiced such as nomadic breeding by the Peulhs, sedentary cattle breeding by the local populations, trade and crafts in the villages market centres.</p>	
Habitat and settlements	<p>The habitat in the study area is distributed among 8 villages surrounding the Project site. All of them have a village nucleus, but while the villages in the municipality of Ze have very easy access to RNIE 2, the villages in the municipality of Tori-Bossito are very isolated. The houses are made of bar clay with a wooden frame and a roof made of straw or sheet metal. There are also houses that are built of final material with roofs of sheet metal or slab.</p> <p>On the Project site, the housing is very scattered. It consists of about 50 agricultural buildings and places of residence. The buildings are often built as permanent structures.</p>	
Health and Safety	<p>The health centres in the Project area are located in the Tangbo-Djevie and Tori-Cada districts. There are no private or public health centres in the villages of the study area.</p> <p>The main diseases affecting the population are: malaria, respiratory diseases, gastrointestinal diseases, urogenital diseases, cardiovascular diseases, dermatological diseases and sickle cell disease. The HIV/AIDS prevalence rate is 1%, but women are more severely affected (1.3%) than men (0.8%).</p> <p>Access to water is provided through various works: traditional wells, modern wells or village water supply systems. The impacted villages in the municipality of Tori-Bossito suffer from poor access to water due to the breakdown of many structures. In Ze, access to water is less problematic.</p> <p>Hygiene and sanitation practices are marked by the virtual non-existence of public and private family latrines in all the districts, resulting in environmental pollution by faeces and insalubrity in the municipality.</p> <p>In terms of safety, the major risk comes from road traffic on RNIE 2.</p>	
Cultural Heritage	<p>No sites representing modern religions (Catholicism or Islam) are present on the Project site.</p> <p>However, there is a sacred forest on the Project site, that of the village of Anavie. Also, the villagers mention the presence of deities on the site that are only accessible to initiates.</p>	

## 7. Analysis of impacts and identification of management measures

### 7.1. Methodology for impact assessment

#### 7.1.1. Approach

The environmental impact assessment methodology proposed here consists in a systematic method derived from the approaches of the World Bank and ISO 14001 which is based on the use of a simplified Leopold matrix adapted to the challenges of the Project.

The Leopold matrix is a qualitative assessment method for environmental impacts created in 1971 and commonly used in environmental assessment. It allows, thanks to a double entry grid, to identify which project activities affect which environmental and social components, then to assess the severity of the expected impact. It provides a visual representation of the impact assessment and helps to synthesize its content in a format accessible to all readers.

The implementation of this methodology is based on 3 steps detailed below.

The **first step** is to:

- On the one hand, identify the **impact factors** i.e. the activities, consumption or emissions of the project which could be the source of impacts on the environment. Identification is done based on the project description and is presented in section 4.9 of this report. Accidental spills related to the process of operating infrastructures are also considered as impact factors but in downgraded mode (not as industrial risks). They are discussed in a dedicated section of the report relating to technological risks.
- On the other hand, identify what are the **sensitive components** of natural and human environments and then assign them a level of sensitivity. The sensitivity of the environment is rated using a 4-level rating scale, from the lowest to the highest scale of environment's sensitivity. The identification of sensitive components was carried out in section 6.6.

The **second step** is to identify which **impact factor can affect each sensitive component** of the environment in order to methodically identify what are the environmental and social impacts generated by the project, whether direct or indirect. The results are presented in the matrix form of the Leopold matrix type so as to visualize the issues globally and quickly (7.1). Sensitive elements of the environment are presented in column and impact factors are presented in row by project phase.

The intensity of the impact is afterwards rated on a scale of 1 to 4 using a semi-qualitative method. The severity of the impact that results from the intersection of the sensitivity level of the component with the intensity of the impact is then determined.

The **third step** is to identify the **avoidance (A) and reduction (R) measures** for the potential impact, then estimate the residual impact once these measures are taken into account. If the implemented measures are sufficient, the residual impact is negligible or minor, therefore no compensatory measure will be proposed and only follow-up can be proposed. The **compensation measures (C)** only intervene in return for a residual impact considered to be significant. Compensation measures (C) are implemented only if avoidance and reduction measures cannot be implemented or are deemed insufficient.

Regarding the residual impacts (after application of the mitigation measures), the Leopold matrix is used again and presents the significance of the impact given the recommended measures. Note that

the complexity of the mitigation measure implementation (in terms of technical aspect, cost or recognized effectiveness) might influence the significance of the residual impact.

Substantially, the presentation of the impact assessment within the report will be based on:

- 1- Presentation of the Leopold matrix on the potential impacts of the project.
- 2- Detailed analysis of impacts by major project phase (design / preparation, construction, operation). Presented in a textual manner, this analysis focuses on the affected components. The impacts of the project (all sources of impact combined) are thus detailed in terms of their effect on air quality, quantity of water resources, habitat, employment or livelihood sources, etc. At the end of the description, the impact severity rating is presented in a table and determined by the strongest index in the matrix. Finally, mitigation measures are proposed, and the residual impact assessed.
- 3- Presentation of the Leopold matrix on the residual impacts of the project.

The assessment of potential and residual impacts is ultimately an expert opinion which takes into account both qualitative, semi-quantitative and quantitative aspects to build its judgment.

### 7.1.2. Environmental sensitivity rating

The rating of the sensitivity of the environment is based on 4 levels. The table below presents for the different components a rating scale of sensitivity and indications that guide the rating. For the social component, 2 indications are given:

- The first indication concerns the proper functioning of the component i.e. its capacity to contribute to the well-being of human beings by offering them a healthy and peaceful living environment, by allowing them to meet their basic needs in housing, food, monetary income and other essential goods or by ensuring social cohesion. These are generally components such as land, economic activities, habitat, demographics, customs/traditions or culture, etc.
- The second indication relates to the existence and efficiency of functionalities providing a service to human beings for needs which they cannot satisfy by themselves, such as access to water, sanitation, electricity, health, safety, education. These are mainly public services.



Table 38 Environmental sensitivity level and criteria

Sensitivity level	Environmental component of the physical environment (air, soil, water, etc.)	Environmental component of the physical environment (wildlife, flora, natural habitats, etc.)	Social component (land, health, demographics)
<b>NEGLECTABLE 1</b>	A functional component i.e. provides quality ecosystem services and does not experience dysfunction due to pressures, pollution or natural or anthropogenic degradation.	Component with no biodiversity and/or no particular issue. Absence of species considered rare, endangered or protected. The species/ecosystems involved are widespread in and out of the country.	Functional component, without pressure, degradation or imbalance. Fully satisfied with existing functionality (e.g., public services).
<b>MINOR 2</b>	Functional component but showing signs of pressure or future risks of degradation or pollution.	Component with a biodiversity without any particular issue. Absence of species considered rare, endangered or protected. The species/ecosystems involved are not widespread but are common.	Functional component but showing warning signs of pressure or imbalance. Component satisfied by existing functionalities, presenting lacks or minor deficiencies.
<b>MODERATE 3</b>	Functional component exposed to high pressures and increasing observed degradation.	Component presenting conservation issue with presence of established vulnerable species or threatened species using the area occasionally. The species/ecosystems involved are rare/protected but common in and out of the country.	Component under high pressure, source of tensions or occasional conflicts. Partially satisfied component with major deficiencies.
<b>MAJOR 4</b>	Non-functional component, experiencing a high state of degradation or pressures inducing irreversible changes already observed.	Component presenting conservation issue with presence of species a strong conservation issue with presence of permanent or regular threatened species. The species/ecosystems involved are rare, endangered or internationally protected	Component in a situation of extreme tension, totally unbalanced and source of recurrent conflicts. Component not satisfied by existing functionalities.

The concept of **sensitivity** takes into account the characteristics of the project and in particular the anticipated impacts, as well as various factors including the extent of the population, biodiversity, the presence of rare or protected species, economic importance, post-impact population recovery or environmental quality, percentage of ecosystem or resource allocated at regional or national level.

The concept of sensitivity differs from the concept of **issue**, which refers to a theme attached to a part of the territory which, given its current or foreseeable state, has value in terms of environmental, patrimonial, cultural, aesthetic, financial or technical concerns. This factor is strictly independent of the project. This criterion is very important insofar as it makes it possible to integrate the current state of preservation or degradation of the various environments in the assessment of the sensitivity of the environment and the importance of the impact.

### 7.1.3. Impact intensity rating

An environmental or social impact may be described as a change in a pre-existing environmental or social state resulting from human activity or intervention. In order to classify the different impacts and to identify those that are the most important, it is necessary to rate their intensity. The notion of intensity covers the characteristics of the impact, its nature, the type of effects (direct or indirect), its duration and its geographical extent.

The intensity (I) of the impacts is rated on 4 levels from the lowest intensity to the highest intensity. The rating is established by an expert opinion, according to the guidelines presented in the table below.

**Table 39 Impact intensity level and criteria**

Level of intensity	Guide
<b>NEGLIGIBLE 1</b>	Negative, direct and indirect impact, short-term (a few months), limited (project area and immediate surroundings) Low consumption of raw materials and effluent discharged close to natural levels, non-hazardous. No observed degradation of environments. No negative incidence on local neighbouring communities whatsoever.
<b>MINOR 2</b>	Negative, direct and indirect impact, short-term (a few months), small or medium scale (project area and surrounding areas, some villages) Significant consumption of raw materials and effluent released detectable, but below thresholds recognized as having an effect on health. Waste generation but properly managed. Moderate and acceptable environmental degradation. Small reversible perturbations on the local neighbouring communities (nuisances mainly).
<b>MODERATE 3</b>	Negative, direct and indirect impact, in the medium term, moderately or widely extended (scale of several villages, of a department). Significant consumption of raw materials with local scarcity and potential conflicts and low biodegradable discharges and/or hazardous substances with chronic human health effects in the event of long-term exposure. Significant production of sorted waste. Significant changes in environments. Irreversible but limited losses for local neighbouring communities (few houses, crops, etc.). Degradation of public services functioning or access due to the project.
<b>MAJOR 4</b>	Negative, direct and indirect, long-term or irreversible, widespread impact (scale of a region, watershed, river, national park). Significant consumption of raw materials with local scarcity and potential conflicts and discharges that are non-biodegradable and/or hazardous substances with potential impacts on human health, including death and serious injuries. Significant waste generation without sorting or treatment. Destruction of large areas of habitat, heritage, landscapes. Irreversible, large-scale losses for communities: several villages displaced, loss of valuable farmland on several hectares, loss of public services, etc.
<b>P</b>	Positive impact Favourable impact to socio-economic development or that may benefit the environment.

#### 7.1.4. Impact importance rating

The impact assessment consists first in identifying whether the impact is positive or negative:

- Negative impact: an impact that generates environmental pollution, social disturbance or damage to private assets or valuable fauna and flora.
- Positive impact: positive impact on socio-economic development or bringing environmental benefits.

Then, it requires identifying if it is direct or indirect:

- Direct impact: an impact that expresses a causal relationship between a project activity and an environmental component;
- Indirect impact: the impact that flows from and follows a direct impact in a chain of consequences.

Thereafter, the importance of the impact should be assessed by multiplying the impact intensity (I) and the sensitivity of the receiving environment (SE) according to the matrix presented below.

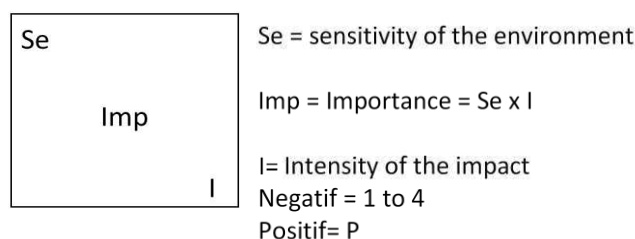


Figure 100: Impact importance rating system

The multiplication result is a figure which indicates the impact importance as per the scoring system presented below.

Table 40 Scoring system for impact importance

Importance Imp = Se x I	Intensity of the effect (I)				
	P	1	2	3	4
Sensitivity of the receiving environment (Se)	1	1	2	3	4
	2	2	4	6	8
	3	3	6	9	12
	4	4	8	12	16

Legend:

Positive impact
P

0 : NO IMPACT	
1-2: NEGLIGIBLE	5 – 9: MODERATE
3-4: MINOR	>9: MAJOR

The importance of the impact can therefore be categorized as follows:

- No impact (white).
- Negligible (blue): the impact is low enough that no mitigation action is required.
- Minor (green): the impact is low, but measures, in particular good environmental and social practices, should be mentioned.
- Moderate (orange): impact that requires avoidance, reduction and compensation measures to become acceptable.

- Major (red): This impact concerns the environmental and social components which are very sensitive or have a very high impact, requiring specific measures to be implemented.

In the analysis, a table as the one below is presented for each impact to summarize the main evaluation criteria.

Table 41 Scoring system for each impact assessment

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### 7.1.5. Identification of mitigation measures

The best way to preserve the environment is to focus first on **avoiding** the identified impacts. For this purpose, the measures envisaged may concern fundamental choices related to the location and technical design of the project in order to achieve geographical, temporal or technical avoidance. Since negative environmental impacts could not be fully avoided at a reasonable cost, the remaining degradation should be **reduced** by technical mitigation solutions.

As a last resort, **compensatory measures** must be taken to provide a positive counterpart if negative impacts persist, aimed at globally preserving the environmental quality of the environment or achieving “no net loss of biodiversity”, or “net gain” based on the values of biodiversity considered. This “Avoid, Reduce, Compensate” or “ARC” approach is good international practice.

The presentation of the measures will therefore be based on the presentation of the avoidance, reduction and then compensation measures.

Compensation measures are used when a residual impact is considered significant. They are implemented only in the event that avoidance or reduction measures cannot be implemented or are deemed insufficient.

## 7.2. Potential impacts matrix

The interrelation between the sources of impact and the environmental components likely to be affected by GDIZ Project is presented in the table below.

**Note: despite the GDIZ development in 3 phases, impacts are assessed regarding the entire Project, especially those related to the Project footprint and GDIZ operations.**

Table 44 : Potential impacts matrix

		PREPARATION	CONSTRUCTION							EXPLOITATION							
	<div><div>No IMPACT</div><div>NEGLIGIBLEMODERATE</div><div>MINORMAJOR</div></div> <div><div>Se</div><div>Imp</div><div>I</div><div>Se = sensitivity of the environment</div><div>Imp = Importance = Se x I</div><div>I= Intensity of the impact</div><div>Negatif= 1 to 4</div><div>Positif= P</div></div>	Project land acquisition	Civil works, including access road & drilling	Traffic	Atmospheric emission	Solid waste production	Liquid discharges production	Employment	Resources consumption (energy, water)	Easement of GDIZ	Atmospheric emission	Solid waste production	Liquid discharges production	Resources consumption (energy, water)	Traffic	Employment	Accidental situation
Physical environment	Climate, air quality and noise																
	Hydrology and hydrogeology																
	Geology, topography and soils																
	Landscape																
Biological environment	Protected Areas																
	Habitat and flora																
	Fauna																
	Ecosystem services																
Human Environment	Demographic balance and migrations																
	Women and gender issues																
	Vulnerable groups																
	Land tenure and land use																
	Economic activities, livelihoods and local economy (employment)																
	Habitat and settlements																
	Health and Safety																
	Cultural Heritage																



## 7.3. Impacts and measures associated to the preparation phase

The main impacts observed during the preparation phase are caused by the Project footprint and its required land acquisition enabling a secured land access, which are a prerequisite for the Project successful completion.

Indeed, GDIZ land acquisition will cause large-scale changes in current land uses which will lead to impacts in terms of economic and physical displacement, modifications of ecosystems, loss of biodiversity, loss of natural resources or cultural heritage, etc.

The effects of the changes in land uses are therefore analysed in this phase to estimate the direct and indirect impacts on the physical, natural and social environment.

The presentation by physical, natural and human environment also respects the chronology effects  $\leftrightarrow$  impacts, the impact on the physical environment having consequences on the natural environment, which also has consequences on the human environment.

### 7.3.1. Impacts and measures on the physical environment

#### Impacts

The entire analysis of the impacts on the physical environment (hydraulic, impact on water quality, noise and GHG emissions, landscape) has been gathered in the sections relating to the impacts of construction and operational activities (sections 7.4.1 and 7.5.1).

The locations of work area / base camp are not yet known as they will be proposed by the main contractor during the tender phase. Although this is temporary facilities, depending on their location and easement, significant impacts could be observed such as:

- destruction of habitat by removal of vegetation leading in destruction of flora and injuries/death for animals;
- soil erosion due to removal of vegetation;
- water pollution due to proximity of the storage area with sensitive areas.

The impacts related to the functioning of these camps are described in the section related to the construction phase.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### Measures

Design measures and procedures must be implemented to limit the use and alteration of soils and vegetation. These measures represent a prevailing criterion in selecting the location and layout of work areas and base camps in order to limit their human and natural environmental impacts. These criteria involve:

- **Soil.** The following points must be considered:

- Preferentially locate work areas and base camp on flat areas to reduce topographical alterations. If necessary, it is preferable to opt for earthworks in steps to minimise soil excavation.
- Locate work areas and base camp as close as possible to the GDIZ areas, while seeking to minimise, whenever possible, their distance from existing roads. This will affect fewer inhabitants and will tend to reduce the sector affected by an access road.
- Ensure rehabilitation of all affected area at the end of the works.
- **Water.** Preferentially locate engine washing areas, hazardous products storage area and waste storage area away from local boreholes and wells in order to limit the risk of accidental contamination.
- **Vegetation.** The following points must be respected:
  - Minimise bush clearing areas by maximising use of existing cleared areas for constructing tracks, work area and base camp.
  - Draw up a procedure for bush clearing, which includes the following aspects: bush clearing/brush cutting only if necessary and limited to a minimum, no felling of trees with diameters exceeding 10 cm and preferred brush cutting method (manual brush cutting).

### 7.3.2. Impacts and measures on the natural environment

The entire analysis of the impacts on the natural environment (biodiversity, fauna and flora) has been gathered in the sections relating to the impacts of construction and operational activities (1.1.1 and 7.5.2).

Impacts in the preparation phase depend, as for the physical environment, of location of work area / base camp. The description of the impact, its assessment and related measures are provided above.

### 7.3.3. Impacts and measures on the human environment

#### 7.3.3.1. Impacts on land tenure and land use

The land on the Project site is currently used for the cultivation of many agricultural products. Land is either planted with perennial fruit trees (palm tree, banana, etc.), with pineapple (2-years growth period) or annual crops (maize, cassava, etc.). Land can also be in fallow although this practice tends to disappear due to strong land pressure in the study area.

As underlined in previous sections (§ 6.5.2.1), land management practices mean that either land is cultivated by its owner or rented to a tenant who will farm the land. There can be therefore 2 individuals having different rights on the same piece of land. Most land assets fall under customary management, meaning that owners do not have any written document proving their ownership. Some assets recently bought have been registered and owners possess official land titles or at least proofs of the registration process.

The land acquisition for the Project will cause impacts on habitats and settlements, in the form of physical displacement (§ 7.3.3.1.1); and impacts on economic activities and livelihoods in the form of economic displacement (§ 7.3.3.1.2). It will not affect any public infrastructures such as schools, health centres, but will affect a cultural heritage site (§ 7.3.3.2). Additionally, physical and economic displacement will fall harder on women and vulnerable groups (§ 7.3.3.2).

Based on the number of persons affected by the Glo-Djigbe airport project, which reaches about 7,000 per 3,000 ha, *i.e.* a ratio of 2.3 person affected by the Project (PAP) per hectare, it can be envisaged that

the Project will affect between 2,000 and 3,000 persons. This figure would include landowners, owners (and possibly residents) of buildings in the Project area, and farmers of the 1,462 ha. However, only a complete census done within the frame of a Resettlement Action Plan (RAP) will confirm the actual number of PAP.

#### 7.3.3.1.1. Impacts on habitats and settlements

Physical displacement caused by the Project has been greatly minimised since the analysis of alternatives for site location has made it possible to avoid the expropriation of entire villages by locating the site on farmland and shaping it so that it only borders villages such as Djitin-Aga (200 meters from Project boundaries) or Agbodjedo (300 meters).

Despite this avoidance strategy, about 50 buildings scattered across the projet site have been counted on the most recent satellite image available (dated from 2018 on Google Earth Pro). Given the date of the image used to make the count, this number might be higher in 2020.

Many of these buildings have been built up over the last 10 years by new land owners (residents or foreigners) who bought land in the area and decided to secure it through developing agricultural activities and settlement on it. These building have either farming or residential vocation meaning that they might be seasonally or permanently occupied by single persons or families. Some might be secondary residences, the owner residing in Cotonou or in another town. Some might be only warehouses where agricultural material is stored.

Therefore, although there are around 50 buildings, the actual number of physically displaced persons might be less important because of the unoccupancy of some buildings.

Physical displacement of PAP usually triggers a succession of negative, indirect impacts beyond the loss of residency. Among the 8 major risks of displacement identified by Micheal M. Cernea<sup>10</sup>, those the most likely to be triggered are:

- **Homelessness**, if not properly managed *i.e.* if housing replacement in kind is not proposed and only cash compensations are used, because money tends to be rapidly dilapidated in compulsive purchase of consumer goods.
- **Marginalization** if the resettlement does not occur in a similar socio-cultural environment as that of the PAP *i.e.* in the same ethnic group since ethnic homogeneity remains very strong in the study area.
- **Increased morbidity and mortality** in the form of social stress and psychological trauma linked to the stress and worries caused by the displacement. Villagers fear that the Project will cause diseases caused by social stress.
- **Loss of access to common property and services**, such as loosing access to pasture for their domestic animals or to firewood collection areas, to a water point or a school that might become too far away to be reached.

All these subsequent impacts lead to a moderate impact because the Project will not displace entire villages and because numerous buildings might not be permanently inhabited.

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<sup>10</sup> Cernea, Michael M. *Impoverishment Risks, Risk Management, and Reconstruction: A Model of Population Displacement and Resettlement*.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### 7.3.3.1.2. Impacts on economic activities and livelihoods

The economic displacement linked to the loss of agricultural land will be much greater than the physical displacement since the Project area spans across around 1,462 ha of almost completely cultivated farmland.

Many pineapple fields will also be lost, which will lead to a drop in the production of pineapple with the Sugar Loaf label and indirectly harm the supply chain and thus its proper functioning and reputation. However, the magnitude of this particular impact is difficult to assess.

Economic displacement usually triggers impoverishment associated with several indirect impacts which all have been identified by the villagers themselves during the social field survey and public consultations. These indirect impacts are:

- **Landlessness:** loss of land is the first impact that can trigger physical and economic displacement. Villagers expressed a strong fear for the loss of their land assets and all that is set up on it. They underlined that they preferred to keep their land because the compensation they will get following expropriation will only last for a certain period and once consumed, they will be left landless without land capital to sustain their agricultural activity. Even if they try to use compensation money to buy other land assets, the compensation amount won't be sufficient to pay for land in the same area due to strong price inflation underlined in § 6.5.2.1.3. Farmers might also be unable to find land to buy as the entire area surrounding the Project site is already fully cultivated. Besides, farmers might be excluded from compensation of their land assets because they cannot prove their ownership with written documents (and are considered in Benin only as presumed owners).
- **Joblessness** can result from economic displacement: some farmers only income source or economic activity might be to grow crops on the Project site. They will lose these incomes and might fall into poverty if they do not find alternative land assets or other form of economic activities. These risks have regularly been mentioned as sources of concern by the villagers, who are mainly farmers and do not have the education and training to engage into other activities (such as in the tertiary sector). They fear that after losing their land, they will become unemployed, unable to find other jobs or sources of incomes, and that other social ills will derive from this condition such as delinquency, theft or prostitution. Some farmers who are simple tenants will also suffer from the loss of land, because they will lose their source of income.
- **Food insecurity:** by putting an end to farming activities, economic displacement can trigger food insecurity if alternative sources of food or incomes are not proposed during the transition period leading to the acquisition of new livelihood source. Villagers have expressed fears from the hunger and famine that the Project might cause, because they mostly rely on their own food production to feed themselves.
- **Social disarticulation:** it occurs when customary organization, traditional interpersonal relationship and mutual assistance systems are disrupted. Villagers fear that the Project will cause social disorganization, family dislocation and divorce because of all the previous impacts.

Overall, economic displacement represents the greatest fear expressed by the local populations during the consultations carried out by Antea Group. The loss of their land makes villagers dread hunger and famine, loss of income and inability to provide for their needs. Unemployment as a result of this loss of activities could according to them lead to delinquency and theft, prostitution, and many other social (loss of cultural identity), family (divorce) and psychological ills, according to them. Villagers also fear the low level of compensation that will be paid, because the amounts offered by the Government for the expropriation of the Glo-Djigbe airport have been very low.

This impact is therefore a major one.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### 7.3.3.1.3. Measures for loss of settlements, economic activities and livelihoods

The measures to be implemented are:

- develop and implement a Resettlement Action Plan (RAP) including Livelihood Restoration Plan in line with IFC standards;
- define an entitlement matrix that is inclusive of presumed owners and land users;
- compensate preferably in-kind landowners holding land titles and presumed owners, as well as land tenants and other land users;
- set up a re-housing program for households losing their principal residence;
- implement a recruitment program targeting PAP in priority and at equal skills;
- establish livelihood restoration programs for households losing their income sources.

The residual impact will be considered moderate given the number of persons potentially affected by the Project.

#### 7.3.3.2. Impacts on cultural heritage

##### Impacts

Benin is a country of many religions and the cradle of the Voodoo culture. Different cults exist, and the country is full of divinities.

No cemeteries or sites representing modern religions (Catholicism or Islam) are present on the Project site.

However, the site encompasses 2 elements of local cultural heritage:

- The sacred forest of the village of Anavie, located northeast of the Project site. Villagers of Agbodjedo, Djitin-Aga and Houeze use this forest for their traditional rituals linked to Voodoo cult. The forest cannot be accessed by foreigners without authorization.
- The villagers mention the presence of sites sheltering Voodoo deities in the Project area, only accessible to insiders. These deities notably protect their fields.



The land acquisition of the site will result in the loss of access to these sites and their potential destruction which would be a major impact for the local communities.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### Measures

In order to take into account the opinions of the sacred forest users on the Project and adequate mitigation measures, a dedicated consultation has been conducted on the 25<sup>th</sup> of August 2020 with the local authorities, including traditional leaders, of Anavie village.

This consultation revealed the authorities expect that the Project footprint is changed to completely avoid the forest and to allow for a permanent access to villagers.

The following measures have been proposed and consist first in avoidance, then if not possible in reduction measures. In any case, there can be no destruction of the forest to respect community's request and rights, and therefore, no compensations are to be proposed.

Measures are:

- **revise the Project design** to exclude the forest from the projet footprint;
- if not technically feasible, **preserve the forest** as it is and integrate it fully into the Project design: fence it off and include in the design a small pathway for villagers (2 to 3 meters large) located along the road so that they can have a direct access from the outside of the site and so that site personnel cannot access it;
- before starting the construction works, **organize rituals and ceremonies with traditional authorities and religious leaders in order to comply with local cultural practices**. The list of rituals to be performed will be provided by the head of village of Anavie to the promoter prior to the start of the works.

The residual impact will be considered moderate.

### 7.3.3.3. Impacts on women and gender issues

Despite a progressive legislation, women in Benin are still subject to numerous forms of discrimination because of the persistence of customary law that is largely unfavourable to them. They are excluded from land inheritance and therefore from customary land ownership which is the prerogative of men, although numerous women are users of land assets that were lended or given to them by their husbands, brothers or other male relatives. They derive incomes from this land, incomes that they might invest in saving groups or in common household spendings.

Because of these persistent discriminations, women will be more severely affected by the physical and economic displacement caused by the Project:

- **Exclusion from women land owners/users from receiving compensation:** during the expropriation and resettlement process, women who are land users might not receive any compensation, whether for the loss of land or incomes generated by its exploitation, since they are not customarily considered as having rights over the land. The compensation could thus be

captured by their spouses, brothers or nephews, which will put them in a very precarious situation.

- **Appropriation of the compensation money by husbands for personnel spendings:** some women may not benefit from the positive spin-offs of the compensation paid to their husbands. Indeed, husbands tend to use compensation money for Projects or spendings that do not meet their families' needs, instead of using money into productive or family-related investments. Compensation money might also be used by men to take on additional spouses in the local context of polygamy.
- **Exclusion from resettlement consultation and decision-making processes:** women will be excluded from the consultation and decision-making processes relating to resettlement since they are already presently excluded from general decision-making in the village (cf. §. 6.5.5.4).

This impact is therefore major.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### 7.3.3.4. Impacts on vulnerable groups

Similarly, vulnerable persons who will lose their land holdings or land uses rights as farmers will be hit harder by the physical and economic displacement. Indeed, vulnerable persons have little economic and social capital, they often already live in hardship, and are not as resilient as non-vulnerable groups to shocks. They will also find greater difficulties to find new sources of incomes, being usually stigmatised and discriminated against among their communities.

Persons with disabilities (PWDs), elderly, women-headed households and widows and poor households will be particularly negatively affected. As underlined in § 6.5.3.3.1, disabled persons usually rely on land and farming for their subsistence and will have great difficulties in finding alternative livelihood sources. Women-headed households and widows will be exposed to compensation grabbing by their male relatives.

Because of that, the impact is major.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### 7.3.3.5. Measures for women and vulnerable groups

Measures tailored to the current situation, rights and needs of women and vulnerable persons that will be affected by the loss of land access must be **integrated into the RAP study**. Among these measures and at a minimum, it is important to plan to:

- establish strategies to identify and compensate women land owners or users;

- pay the compensation in the name of both spouses;
- set up strategies to identify and assist households with vulnerable persons;
- stagger compensation payments over a minimum of 2 periods;
- include representatives of women and vulnerable persons in the RAP monitoring committee.

Thanks to these measures, the residual impact is moderate.

### 7.3.4. Impacts and measures synthesis for the preparation phase

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
Soil, natural habitat, surface water	Work area and base camps easements	<ul style="list-style-type: none"> <li>-Destruction of habitat by removal of vegetation leading in destruction of flora and injuries/death for animals</li> <li>-Soil erosion due to removal of vegetation</li> <li>-Water pollution due to proximity of the storage area with sensitive areas</li> </ul>		<p><b>Soil</b></p> <ul style="list-style-type: none"> <li>-Preferentially locate work areas and base camp on flat areas to reduce topographical alterations</li> <li>-Locate work areas and base camp as close as possible to the GDIZ areas in view to reduce the sector affected by an access road</li> <li>- Ensure rehabilitation of all affected area at the end of the works</li> </ul> <p><b>Water</b></p> <p>Preferentially locate engine washing areas, hazardous products storage area and waste storage area away from local boreholes and wells in order to limit the risk of accidental contamination</p> <p><b>Vegetation</b></p> <ul style="list-style-type: none"> <li>-Minimise bush clearing areas by maximising usage of existing cleared areas</li> <li>- Draw up a procedure for bush clearing with preferred brush cutting method (manual brush cutting)</li> </ul>	
Habitat and settlements	Project land acquisition	Physical displacement of around 50 buildings		<b>Develop and implement a Resettlement Action Plan (RAP) including Livelihood Restoration Plan in line with IFC standards</b>	
Economic activities, livelihoods and local economy (employment)	Project land acquisition	Economic displacement of an estimate of 3,000 persons		<ul style="list-style-type: none"> <li>-Define an entitlement matrix that is inclusive of presumed owners and land users</li> <li>-Compensate preferably in-kind landowners holding land titles and presumed owners, as well as land tenants and other users</li> <li>-Set up a re-housing program for households losing their principal residence</li> <li>-Implement a recruitment program targeting PAP in priority;</li> <li>-Establish livelihood restoration programs for households losing their income sources.</li> </ul>	

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
Women and gender issues	Project land acquisition	Exclusion of women from compensation processes and decision-making processes related to physical and economic displacement		<b>Measures to be included in the RAP:</b> -Establish measures to identify and compensate women land owners or users -Set up measures to identify and assist households with vulnerable persons -Stagger compensation payments over a minimum of 2 periods	
Vulnerable groups	Project land occupation	Difficulties for vulnerable groups to find alternate livelihood sources following physical and economic displacement because of poverty, stigmatization and discrimination		-Include representatives of women and vulnerable persons in the RAP monitoring committee	
Cultural Heritage	Project land acquisition	Destruction of sacred forest of Anavie and of individual sites sheltering Vodouns deities in the Project area		-Revise the Project design to exclude the forest from the projet footprint -If not technically feasible, preserve the forest as it is and integrate it fully into the Project design: fence it off and include in the design a small pathway for villagers -Organize rituals and ceremonies with traditional authorities and religious leaders in order to comply with local cultural practices	



## 7.4. Impacts and measures during the construction phase

### 7.4.1. Impacts and measures on the physical environment

#### 7.4.1.1. Impacts on climate and air quality

##### Impacts

Air quality can be affected by different sources of pollution:

- **Smoke and greenhouse gas**

Combustion engines of construction machineries, compressors and electricity generators generate smoke and greenhouse gas. This kind of emission will be observed in the whole surface of the GDIZ area. Indeed, during the construction phase, some 40 trucks and construction equipment will use the access roads and drive around the Project site.

Traffic will also represent a source of pollution, although of much less importance. The crossing of the various villages by supply trucks will generate atmospheric emissions in sensitive inhabited areas. Beyond the inconvenience for the persons who live along the road, this also raises concerns regarding public safety discussed later.

The main impact factor for smoke and greenhouse gas comes from the clearing activities. Indeed, these can lead to large and uncomfortable smoke emissions in case of burning green waste (produced in large quantities as a significant portion of the area covers agriculture and natural vegetation plots (99 %)).

- **Dust**

This is usually the most damaging impact of large construction sites during dry periods. Dust is generated on site by earthmoving operations, storage of excavated materials and products, material crushing units and the concrete plant.

The IAQM guidance<sup>11</sup> suggests that if the sensitive 'ecological receptors' is greater than 50 m from the boundary of the site, 50 m of the road used by construction vehicles, or 500 m from the site entrance, it can be screened out.

Onsite, there will be no human receptors (apart for workers), the closest ones that will be affected will be the villages crossed by the vehicles and engine, especially if it is unpaved roads. This mainly concerns Agbodjedo, Djitin-Aga and Anavie.

The level of the potential impact in terms of air quality is considered moderate because of the initial air quality relatively preserved and the location of Agbodjedo, Djitin-Aga and Anavie closest to the site (from 100 to 400 metres).

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

<sup>11</sup> Guidance on the Assessment of Dust from Demolition and Construction, Version 1.1. Institute of Air Quality Management (IAQM) (2014)

## Measures

The measures to be implemented are:

- control of the air quality impact with formalized measures through the drafting of an operational ESMP to be implemented by the main contractor: operational ESMP based on the ESMP of this ESIA and validated by the promoter before starting work;
- comply with decree n°2001-110 of 4 April 2001 setting air quality standards;
- **limit the vehicles speed** to 30 km/h in all inhabited areas, and, if possible, pave the road section concerned;
- **waste reuse, composting and recycling, including green waste.** Burning waste (including green waste) is strictly forbidden. Facilitate the green waste recycling (logs and large branches) near the villages;
- **humidification**, when necessary, of unpaved village roads crossed by trucks and the excavated land stored on the construction site in case of severe drought and high winds;
- **covering trucks** transporting pulverulent materials (such as excavated soil);
- use of good quality equipment and vehicles, preferably new, and regular inspection and maintenance of work engine and equipment (exhausts);
- **dust monitoring** undertaken on the site boundary and villages crossed by the main roads used by the Project vehicles and engine;
- complaint mechanism implemented in the nearest villages (Agbodjedo, Djitin-Aga and Anavie) to address potential dust issues.

The residual impact will be considered minor.

### **7.4.1.2. Impacts on the environmental noise**

#### Impacts

Construction activities will take place outside, where they will be affected by changing weather, wind tunnels, topography, atmosphere and landscaping. Construction engines generating noise, *e.g.* heavy earth moving equipment, will move from location to location and noise will likely vary considerably in intensity throughout a workday.

Earthworks, concrete and asphalts fabrication, construction activities will be the main source of noise. Most of the noise from these sources is inherent to a construction site and difficult to subdue. Traffic will be also cause noise, specifically in the villages crossed by the vehicles.

The noise levels of common construction noise sources are well-known and are described below:

Table 42 Noise level of common engine

Equipment	Typical Noise level at 30 metres, dB(A)
Scraper at full load	83 – 92
Dozers ripping	80 – 90
Loaders (100 – 200 kW)	77 – 80
Cranes (small mobile)	74 – 77
Dump trucks	65 – 82
Diesel generator sets (250 kVA)	74 – 81
Welding Sets	69 – 75
Concrete trucks	69 – 78
Pile driver (air hammer)	80 – 101
Chipping hammer on steel	63 – 81
Grinder	63 – 68
Air compressor	65 – 67

Source: World Health Organization

As described in the baseline (§ 6.3.2.3), the Project is located in an area where activities generating noise and vibrations are almost non-existent. The level of noise and vibration will therefore increase compared to the baseline conditions.

Sensitive receivers (villagers) are all located at 110 meters at a minimum from the GDIZ area. The distance between a noise source and noise receiver can be considered a barrier. Doubling the distance from the noise source lowers the noise level by 6dB.

Thus, the impact is rated as minor.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

## Measures

During the construction works the predicted noise levels should be considered in establishing work site locations, construction techniques and on-site practises. The following principles and proactive noise management measures should be considered for implementation by the main contractor:

- **limit construction works to daytime hours where reasonable and feasible.** Engines shall not be started and on-site activities shall not be undertaken outside of the daytime construction hours. Non-noisy generating works can be undertaken at staging areas where works are not adjacent to residential receivers;
- using equipment that has been well maintained so that noise emissions are minimised;
- **construct physical noise barriers** along Project boundaries / around the main source to create a buffer between the Project site and surrounding populated areas;

- **villagers are to be notified a minimum of 2 weeks prior to the commencement of construction works.** The notification would detail proposed construction works, permitted hours of work and potential noise impacts;
- **transportation vehicles should maintain appropriate travelling speeds** along the roads and should avoid the running of engines for long periods of time when in a stationary position at the Project site;
- **noise monitoring** to confirm the actual construction noise levels at representative sensitive receiver locations should be undertaken. This monitoring should be carried out at the start of the construction of the Project and on a quarterly basis;
- complaint mechanism implemented in the nearest villages (Agbodjedo, Djitin-Aga and Anavie) to address potential noise issues.

The residual impact is rated as negligible.

### 7.4.1.3. Impacts on hydrology and hydrogeology

#### 7.4.1.3.1. Water quality

No permanent surface water was observed onsite, only temporary ponds are formed during the raining season (one local depression in the sacred forest and 2 or 3 others in the rest of the site which can contain water until it disappears due to evapo-transpiration and infiltration). The site has a longitudinal depression running northeast/southwest that gathers and leads superficial runoff towards the Lama river. Because the major part of runoff infiltrates in the soil during the rainy season and the Lama river is already largely affected by anthropic activities, there are currently no issues of water quality in the Lama river.

The Mio-Pliocene aquifer is deep (48 meters below ground level) and confined and is thus protected from any source of external pollution. Nevertheless, superficial unconfined aquifer, where rudimentary superficial wells are drilled by villagers, are exposed to pollution and are particularly vulnerable to contamination from latrines and agriculture.

Works activities can influence water quality. Indeed, the risk of degradation of the chemical and biological water quality can be induced by the temporary concentration of construction and population activities. The following table summarizes the various potential sources of pollution resulting from these activities and indicates the type of risks they are likely to generate, the environment affected and the possible impact.

**Table 43 Impacts on water quality from effluents and waste on construction sites**

Impact factor	Receiving environment	Description	Potential impact
Wastewater from workers accommodation	Soil Groundwater by infiltration  Surface water during rainy season	Discharge on ground: grey and black water (suspended matters, organic matters and bacteria)  Infiltration to groundwater  Soil leaching until the Lama river through the longitudinal depression.	Degradation of the natural aquatic environment quality (lack of oxygen, turbidity) and impact on aquatic life (direct impact).  Risk to human health in the event of consumption of polluted water: superficial groundwater can be affected though soil infiltration of discharges (indirect impact)
Wastewater from concrete / asphalt production, equipment/engines washing	Soil Groundwater by infiltration  Surface water during rainy season	Discharge on ground: water with hydrocarbon, high concentration in SM)  Infiltration to groundwater  Soil leaching until the Lama river through the longitudinal depression.	Degradation of water quality (lack of oxygen, turbidity, chemical pollution) (direct impact).  Possibility of acute toxicity to aquatic life depending on the concentrations (indirect impact).  Superficial groundwater can be affected though soil infiltration of discharges (indirect impact)
Waste production from clearing activities, workers accommodation, works	Soil (waste) Groundwater by infiltration (leachate)  Surface water during rainy season	Leaching of waste storage areas (leachate) and infiltration to groundwater (mainly organic matter) / Lama river.  Dispersion of waste which may be carried by run-off water and flow towards the longitudinal depression to the Lama river.	Visual degradation (direct impact) Soil pollution (direct impact)  Leachate from waste or spills can affect groundwater quality of unconfined aquifer in case of soil infiltration: degradation of water quality (lack of oxygen, turbidity, chemical pollution) (indirect impact)
Hydrocarbons, used oils, solvents, pesticides and other hazardous products (storage and handling)	Soil Groundwater by infiltration  Surface water during rainy season	Leaks Accidental spills  Leaching of polluted or treated areas (pesticides)	Acute toxicity to aquatic life (indirect impact)  Risk to human health in the event of consumption of polluted water: superficial groundwater can be affected though soil infiltration of discharges (indirect impact)

Due to the soil nature, there is an erosion risk strengthened by the clearing activities and the removal of all vegetation. Bare soils are more exposed to erosion, mainly during the rainy period. It also concerns storage areas for materials and excavation products. If these areas are not stable (non-cohesive materials), the rains can easily erode the piles. The site has a longitudinal depression running northeast/southwest and heavy rainfall can lead to increase the sediment transport from the highest points to the lowest points. Sediment accumulation can therefore be observed towards the longitudinal



depression connected to the Lama depression. But during the rainy season, hydraulic connexion is not observed removing any risk of sediment transport until the Lama river.

As no permanent surface water is onsite, impacts on surface water quality are expected to be minor, except during the rainy season and on the pond in the sacred forest where the impacts might be higher. But due to the fact that the ground slopes towards the south-west, that the location of the pond is on the north-east of the site and that the surface water networks are not linked to sensitive aquatic ecosystem, impacts will be limited.

Regarding groundwater, due to the presence of an unconfined aquifer, leachate can infiltrate the ground and affect the water quality. But as the works will not imply large volume of dangerous products, impacts are considered minor.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### 7.4.1.3.2. Water resources

During the construction phase, the works will consume water for various activities: concrete making, vehicles washing, tracks humidification and domestic use, etc.

Considering a peak attendance of 1,000 workers for the entire site and a specific consumption of 50 L / person/day, as well as a consumption of around 10 m<sup>3</sup>/day for site activities, the daily water requirements for the site are presented in the table below.

Table 44 Water consumption for the construction phase

Item	Description
Works period (months)	24
Workforce (peak)	1,000
Daily needs (m <sup>3</sup> )	50
Works needs (m <sup>3</sup> )	10
TOTAL for one day (m <sup>3</sup> )	60
TOTAL for the work period (m <sup>3</sup> )	31,680

Water needs can put pressure on underground resources and compete with other uses if the volumes are large compared to the operating flows of existing structures in the area (including rudimentary wells for domestic uses).

The water supply arrangements for the construction site are not yet defined, as they will be submitted to the promoter during the main contractor's selection phase. The work camp will be located outside of the GDIZ site, probably in an area isolated from the water supply network of the site. It is recommended to provide employees with drinking water from bottled water and to satisfy the water needs for work via a tank, so that no competition for water uses will be observed.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### 7.4.1.3.3. Hydraulic patterns

The existing drainage pattern largely follows the natural topographical conditions of the Project site that conveys the runoff into the central valley and flows further south outside the Project boundary. Locally, 2 or 3 small local depressions exist and collect runoff (including the one in the sacred forest) water during the rainy season.

Projected earthworks, road development and construction of the GDIZ utilities will lead to a partial soil sealing. This impermeable area is about 195 Ha (or 13,5% of the overall area), as a minimum – the others commercial and industrial areas may lead in soil sealing but their easements are yet not known, giving a moderate part of the area considering the soil were initially uncoated. The work area and base camp will also waterproof the soil, but their location, surface and organisation are not yet known (during the main contractor's selection phase). Nevertheless, despite some local hydraulic modifications due to grading and levelling, the main flow direction toward the central portion will be maintained because it will be used as the central drain for wastewater in operation phase.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### 7.4.1.3.4. Measures

All these risks can be controlled with the implementation of adequate measures at the beginning of works:

- control of the water quality impact with formalized measures through the drafting of an operational ESMP to be implemented by the main contractor: operational ESMP based on the ESMP of this ESIA and validated by the promoter before starting work;
- **stripped soil management.** The soil storage area that will not be remobilised for 6 months will be covered with a thin topsoil to promote the development of herbaceous vegetation. The other temporary storage zones will be protected on their slopes by a synthetic cover;
- main excavation work shall be conducted **during dry periods**, as much as possible;
- **water supply with bottle and tank:** provide each worker with 3L of drinking water per day for consumption (WHO recommendation). A tank will be regularly filled out for works' needs (car washing, concrete preparation, etc.). This tank should be linked to a rainwater collection system to minimize the extraction from the local aquifer;
- selection of **porous asphalt** to favor water infiltration and reduce runoff water;
- develop an **emergency plan** in case of accidental spillage with a definition of intervention measures in case of accidental spillage in order to limit the pollution;

- implementation of a sensitization and training program for workers.

Specific measures apply to the work area/base camp, especially to workers accommodation and storage area:

- **implementation of wastewater treatment systems:** deploy a conventional sanitation network with wastewater treatment and installation of septic tanks (sanitary infrastructures) for workers' camp and, because of the large surface of the site and depending on the location of the work area/base camp, installation of a system like dry latrine in the work area might be considered.
- **Identification of appropriate place for chemicals and dangerous products storage.** Storage on dedicated secured platforms: waterproof concrete slab surrounded by a low wall ensuring the retention of a volume at least equal to 110% of the largest container located on the platform (maximum of 10,000 l to be authorized for gasoline or diesel). The platform must be covered, and its evacuation equipped with an oil separator. Selected place shall be far away from any boreholes, wells and stagnant water area (including temporary water).
- **appropriate storage for dangerous products.** Label and store chemicals in appropriate areas and ensure compatibility of storage (toxicity information and material safety data sheet (MSDS) available to workers);
- **identification of appropriate places for engine refuelling, maintenance and washing.** The maintenance and washing of engine and equipment will be limited to areas defined for this use, equipped with a concrete slab and a peripheral drainage evacuating runoff through an oil separator (hydrocarbon water) and/or sedimentation basins depending (sediment water). Selected place shall way from any boreholes, wells and stagnant water area (including temporary water).
- **implementation of collection, monitoring and waste treatment plan,** for all produced waste in the work area/base camp and on construction sites (cf. § 7.4.1.6);
- **water quality monitoring program from worksite areas.** Inventory of the discharge points to be monitored: the discharges of wastewater after treatment, the discharges of water after the oil separators, the discharges of water after the sedimentation basin of the concrete plant. The program must take as references the values of the beninese regulations (Decree No 2001-109 of 4 April 2001) and IFC standards (general EHS guidelines) to define the discharges compliance values, especially the following bacteriological and physico-chemical indicators: Total coliforms, BOD<sub>5</sub>, COD, Total nitrogen, Total phosphorus, Total hydrocarbons, pH, suspended matters. A periodicity should be clearly defined.

The residual impact will be considered negligible.

#### 7.4.1.4. Impacts on geology, topography and soils

##### Impacts

During the construction phase, soil quality is likely to be affected in the event of accidental spillage of hazardous liquid products or waste (hydrocarbons, drain oils, paints, solvents, etc.) or unmanaged effluent (suspended matters, organic matters and bacteria). In case of spillage, main issues will be about the groundwater contamination through soil infiltration. See previous section (§ 7.4.1.3.1) for impacts description.

The impact of a development on the geology, topography and structure should be assessed in terms of:

- The removal of superficial/bedrock deposits.

- The superficial/bedrock deposits' stability.

The soil of the Project area will be modified due to grading and levelling activities. It is these cut / fill zones which can be affected by rain erosion during storage and handling and generate sediment. The management of cut / fill must be anticipated because it involves:

- Temporary storage of non-cohesive materials during construction which may be easily affected by erosion and which may lead to landslides if the deposits are too high, steep or poorly stabilized.
- A surplus of cut to be stored on the site permanently because it cannot be reused.

The works is projected to follow as much as possible the natural topographical conditions of the Project site to maintain the existing drainage patterns. Moreover, temporary soil disturbance can be observed for the development of the works area and base camp.

As no large excavation or significant bedrock disturbance is anticipated, impacts on geology and topography are expected to be negligible. Moreover, without any works or modification of the subsoil and in area weakly concerned by the seismic risk, no impact on seismic phenomena is expected.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLECTIBLE	NEGLECTIBLE	NEGLECTIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### Measures

For the measures related to soil contamination, those defined in case of spillage in the above section (§ 7.4.1.3.1) applied for the soil. Other measures have to be deployed:

- **Stripped soil management.** The soil storage area that will not be remobilised for 6 months will be covered with a thin topsoil to promote the development of herbaceous vegetation. The other temporary storage zones will be protected on their slopes by a synthetic cover. Deposits should not exceed 6 meters in height, their slope 1.5H / 1V and be equipped with a mid-height riser (3 meters).
- **Optimization of cut and fill.** The design expected a neutral cut / fill balance sheet. This optimization limits costs as well as many environmental impacts such as energy consumption, GHG emissions, truck traffic, dust emissions and noise pollution.
- **Implementation of silt fence** to retain the soil on disturbed land until the activities disturbing the land are sufficiently completed to allow revegetation and permanent soil stabilization to begin. A reasonable rule-of-thumb for the proper amount of silt fence is 30 meters of silt fence per 1,000m<sup>2</sup> of disturbed area (EPA stormwater best management practice). The silt fence shall be placed on slope contours or at the bottom edge of the soil piles to maximize ponding efficiency. Heavy porous filter fabric like geotextile with steel posts shall be privileged.
- **Progressive soil rehabilitation** to avoid large erosion phenomena, especially during rainy season. Revegetation and soil stabilization shall be considered, including for the work area and base camp.

The residual impact will be considered negligible.

#### 7.4.1.5. Impacts on landscape

##### Impacts

Impacts on landscape during construction phase are mainly related to the presence of the works and the good keeping of the areas used for the Project such as the working areas and the base camps.

Topographic relief is minimal and land use is predominantly agricultural, hence no particular point of view on the Project area exists (such as from an upper hill). The area will not be likely visible except by outdoor farmers and recreational users.

Besides, it is likely that with natural screening from the vegetation, local villagers will be unable to view the construction works unless they are working within a proximity to the area. The landscape impacts are therefore very limited in this phase.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

##### Measures

Measures to be implemented are mainly related to the good upkeeping of the works areas and the waste management:

- **Implementation of collection, monitoring and waste treatment plan**, for all produced waste in the work area/base camp and on construction sites (see section 7.4.1.6).
- Complaint mechanism implemented in the nearest villages (Agbodjedo, Djitin-Aga and Anavie) to address potential landscape issues.

#### 7.4.1.6. Focus on solid waste

##### Impacts

Significant amounts of solid waste will be generated by construction activities, base camps and canteens. The risks of water and soil pollution are high if these wastes are not properly managed, with indirect impacts on groundwater, surface water, soil and air quality and development of disease vectors (mosquitoes, flies, rats) harmful to public health.

The pollution risks vary according to the nature of waste: organic matter, bacterial and viral populations, chemical pollutants (metals, hydrocarbons, biocides, etc.), odors, suspended matters, plastic bags, other visual pollution).

Four categories of waste can be defined:

- **Domestic waste**: quantity of domestic waste, mainly produced by the work area and base camp can be estimated at 0.62 kg / person / day. This waste mainly includes waste from canteens, packaging and plastic bottles, glass bottles, paper and cardboard. The overall production for 1,000 workers (in the case of a maximum workforce) would therefore represent 620 kg of domestic waste per day, i.e., for a density of around 700 kg / m<sup>3</sup>, a volume of 0.88 m<sup>3</sup> / d. The illegal dumping of this waste would pose a threat to health in the camps and surrounding areas, as it would lead to unsanitary conditions, unpleasant odors and the development of disease vectors.



- **Green waste:** they mainly come from clearing operations. The Project easement is 1,462 Ha including 1,439.3 ha of agricultural land (low-growth cultures, orchard, fallow land) and 11.71 ha of relic of natural vegetation that will be entirely cleared, except the sacred forest (4.37 ha).
- **Inert waste:** they are generated at the Project area but also in the work area in widely varying amounts. They mainly concern soil, wood, packing boxes, scrap metal, plastics and concrete debris. This waste is generally buried in appropriate sites or in inert material disposal site. They do not represent a direct danger to health.
- **Dangerous waste:** hazardous waste such as vehicle batteries, oil filters, drums that have contained hazardous products and electric batteries are also generated by construction activities, but in specific places such as engine maintenance areas. This waste is very damaging to the environment and public health and must receive appropriate treatment to ensure that they are eliminated safely.

The impacts resulting from poor waste management are moderate.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### Measures

The waste management plan will be framed with formalized measures through the drafting of an operational ESMP to be implemented by the main contractor: an operational ESMP based on the ESMP of this ESIA and validated by the promoter before starting work.

The 2 main steps of the implementation of this plan are to:

- **Confirm with the Government the need to develop a landfill site** in close vicinity of the GDIZ site or to expand an existing landfill (whose location is not known at the writing time of this ESIA). The landfill will be required both for construction and operation phases. If a new landfill has to be developed, a dedicated ESIA shall be planned under the government responsibility.
- **Identify recognized beninese companies** in order to regularly collect and treat recyclable and specific waste (hazardous).

The waste management plan will include for each type of waste, treatment methods complying with local regulations, or if not, with international best practices identified. Waste management during construction phases should follow the waste management hierarchy that consists of prevention, reduction, reuse, recovery, recycling, removal and finally disposal of wastes. The hierarchy states that as far as practicable, the generation of wastes should be avoided or minimised. Where waste generation cannot be avoided it should be reused, recycled or recovered. Where waste cannot be recovered or reused it should be stored, treated and disposed of in an environmentally sound manner. The possibility of the local population recovering recyclable material should be studied and implemented when feasible but with caution to avoid responsibility and judicial issues.

Measures of the waste management plan are the followings:

#### For green waste:

- Valuation of wood with commercial values;

- Provision to the local population of wood that can be used as timber or firewood in a usable / transportable form by the population;
- Compost production with small size crushed vegetation (branch and leaf). Composting can be used during site rehabilitation;
- Waste burning will be avoided whenever possible. If it cannot be avoided, it will be carried out as far as possible from inhabited areas.

**For domestic waste:**

- Install selective sorting bins at work areas/base camps to separate recyclable and decomposable organic material. Create a closed storage area to curtail the risk of waste blowing away and to avoid attracting wild animals;
- Regularly clean waste bins and storage areas;
- Make employees aware of the importance of waste management and workplace cleanliness.

**For inert waste:**

- Implementation of selective waste collection for sale to local dealers / recycling industries;
- Maximum effort should be made to reuse and recycle them. The material can be used for filling/levelling of low-lying areas or filling borrow pits close to the site.

**For hazardous waste or products:**

- Hazardous waste, chemical products and hydrocarbons will be stored in dedicated, secure areas. These areas will be sealed and equipped with retention basins to prevent any risk of leakage to the environment. Fixed facilities containing liquid pollutants will also be placed inside retention basins (e.g. electricity generators, compressors, etc.).
- No waste or hazardous product storage facility will be located in an area subject to flooding or near a drinking water source.
- Submit a request for waste transport to Authorities.

The residual impact will be considered negligible.

## 7.4.2. Impacts and measures on the natural environment

### 7.4.2.1. Impacts

#### 7.4.2.1.1. Affected land occupation

The different kind of surfaces affected by the Project are the following:

Table 45 Project easement and natural habitats

Project easement	Surface (Ha)	Affected habitat (type and surface)	Comment
GDIZ area (industrial, commercial, warehouse, parking, facility, storage, residence, green space, roads)	1,462	Crops (677.29 ha, or 46.32 %)	Agricultural land - modified habitat
		Fallow land (762.01 ha, or 52.12%)	Agricultural land - modified habitat
		Agricultural tracks, bare soil & infrastructures (11 ha, or 0.8%)	Tracks and bare soil - modified habitat
		Relic of natural vegetation (7.33 ha, or 0.5 %)	Degraded forest and shrubland – natural habitat
		Sacred forest (4.37 ha, or 0.29%)	Natural habitat
Electric line (site connection with the main power station)	Unknown	-	To be determined with the Government
Works area / base camp	Unknown	-	Temporary occupation, rehabilitation (revegetalisation at the end of the Project)

The overall Project area is used for agricultural activities and is essentially made up of a mosaic of high and low crops and fallow land, except 7.33 ha occupied by relic of natural vegetation and 4.37 ha with the sacred forest.

Agricultural formations and bare soil are the most impacted surfaces with 1,450 ha, or 99% of the area. A large part of these agricultural formations includes fallow land. Due to the small presence of natural vegetation onsite, this kind of habitat is slightly affected but is nevertheless concerned by the Project easement.

1,451 ha of vegetation will be cleared for the Project need, however, given the high degree of these habitats' degradation by anthropic activities, the impact is reduced.

Overall, the impact of the Project's easement on habitats is minor because the Project area has been highly transformed by human activities and present no major ecologic sensitive issues.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### 7.4.2.1.2. Loss of habitats

As shown in the Figure 66, we can observe 2 type of habitats on site:

- Terrestrial modified habitat: 1,450.3 ha, or 99.2% of the Project area;
- Terrestrial natural habitat (including a temporary pond during the rainy season): 11.7 ha, or 0.8% of the Project area.

As the entire area will be rearranged by the construction works (clearing activities and earthworks), all the habitats will be impacted and removed. The terrestrial modified habitat has no ecologic values and is common in the area. It is composed of agricultural land, bare soil and inhabited area. The potential impact is judged null to negligible.

Regarding the natural habitat, the pressure of human activities has led to a fragmentation of the natural habitat and a loss of its ecologic values. To date, this type of habitat in the Project area is only represented by small relics areas and the sacred forest. The field investigations noted a preponderance of pantropical species which are species with a wide geographical distribution and confirms the disturbance of the local flora. The biodiversity is relatively richer in rainy season than dry season. The natural vegetation (and therefore the associated habitat), despite it constitutes a privileged biodiversity area, has no longer its phytogeographic specificities following its degradation by surrounding human activities.

Because of the “sacred character” of the forest, this small natural zone has remained relatively preserved. Nevertheless, the habitat has a medium ecologic diversity also affected by human perturbation.

None of these habitats is likely to host species with high level of conservation values (classified in the global UICN red list, migratory species, threatened and/or unique ecosystem).

The potential impact is consequently judged moderate.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### 7.4.2.1.3. Loss of ecological floristic richness

The Project will remove all floristic species in the Project area during construction. Field investigations during dry and rainy season have shown that there are:

- No endemic or critical habitat indicator species;
- A total of 156 species recorded;
- 11 species protected under the national regulation (law n°93-009 of 2<sup>nd</sup> July 1993);
- 45 species recorded in the global UICN red list, including:
  - 2 species “data deficient – DD”
  - 40 species “least concern – LC”
  - 1 species “near threatened – NT”
  - 2 species “vulnerable – VU”.
- 11 species recorded in the beninese UICN red list, including:

- 6 species “least concern – LC”
- 1 species “near threatened – NT”
- 1 species “vulnerable – VU”.
- 3 species “endangered – EN”.

The species classified with the endangered status at Benin IUCN red list is the *Triplochiton scleroxylon*. It is a forest species observed in the sacred forest. *Triplochiton scleroxylon* is widely distributed in the forest zone of West and Central Africa from Guinea east to the Central African Republic, and south to Gabon and DR Congo. Despite its large distribution and its classification as priority species selected for afforestation, the reproduction rate of this large tree is very low, reducing its natural conservation and development capacity. Moreover, since it is a of high socio-economic value species, the species is increasingly threatened by anthropogenic pressures from various sources. Two other species are with EN status, *Khaya senegalensis* and *Milicia excelsa*, outside of the sacred forest. *Khaya senegalensis* and *Milicia excelsa* have EN status on the Benin Red List because the species in their natural ecosystem are under a lot of pressure due to the fact that:

- The breeders prune them savagely, especially during the transhumance period.
- Branches are the favorite food of cattle.
- The species is used in the pharmacopoeia to treat 41 diseases.
- They are also used as lumber.

Location of emblematic species are illustrated in Figure 70.

Apart from the impacts related to the Project's footprint, the works will have limited impacts, especially if the site is properly managed. The impact factors during the construction phase on flora are quite generic with:

- The **accidental or non-accidental introduction of invasive alien species**. Indeed, the input of solid materials from outside the Project site and the movement of vehicles increase the risks of introducing invasive species. The consequences of this introduction vary depending on the species introduced and the capacity of the environment to regulate them. Several invasive species have been already observed onsite, including in the sacred forest such as: *Acalypha ciliate*, *Bidens Pilosa*, *Desmodium velutinum*, *Digitaria horizontalis*, *flueggea virosa*, *Imperata cylindrica*, *Mitracarpus hirtus*, *Panicum maximum*, *Paspalum orbiculare*, *Phyllanthus Amarus*, *Setaria barbata*, *Triumfetta rhomboidei*, *Waltheria indica*. The risk here is that the excavated soil including seeds and seedlings of invasive terrestrial may be moved to other sites or reused elsewhere.
- **Failure to respect the site rights-of-way** which might cause an accidental removal of vegetation outside the necessary rights-of-way.
- In case of uncontrolled spontaneous migration, additional significant anthropic pressure can be observed on useful wood species as energy sources and building materials and the need for farmland (new land to be cleared).

The Project is not likely to disturb a significant portion of floristic population with high ecologic values, except the *Triplochiton scleroxylon*. The impact is judged moderate.

The proponent plans to develop numerous green spaces on the site, along certain roads and also to delimit the plots allocated to businesses. These green spaces will partially offset the Project's negative impacts on vegetation, especially because the green spaces areas are higher than the natural vegetation already on site. The Project planned to use the following species: African Mahogany (*Khaya spp*), African Birch



(*Anogeissus leiocarpa*), Ebony (*Diospyros ebenum*), Shea nut (*Vitellaria paradoxa*), *Terminalia Mantaly*, Neem (*Azadirachta indica*), Silver Oak Tree (*Grevillea robusta*).

Exterior materials required for backfilling will not require the creation of borrow pits, as the sands used will come from quarries that have obtained State approval to operate. Thus, no additional ecosystems will be affected to benefit from these materials.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### 7.4.2.1.4. Loss of ecological faunistic richness

Unlike flora, animal species are not fixed, but evolve in their habitats in varying ways from one species to another. The removal of a portion of habitat does not necessarily imply a significant impact on the population whose numbers may move.

For example, the conversion of a few hectares of forest and shrubland into a modified zone is not likely to modify the populations of mobile fauna which have not saturated its environment, such as amphibians or little mammals. All of them can find refuge in the surrounding areas which presents mostly the same habitat characteristics.

Regarding the birds, 2 species observed on site are protected by the national regulation but are classified LC by the global IUCN red list, *Psittacula krameria* and *Scotopelia peli*. Moreover, several clues indicate that the site is a nesting area for several bird species. The most sensitive species are those known as ground-nesting because they are less visible. *Pternistis bicalcaratus*, which is a common species, was observed twice on site for the laying and brooding of eggs. 10 other species common in Benin whose nidification was confirmed onsite were also observed.

Birds, specially eggs and juveniles, will be affected by the clearing activities and earthworks if the construction work start during the nesting period.

Mammals, reptiles and amphibians that are known as present on-site will be indirectly affected by the clearing activities and the loss of their habitat. No species with high ecologic values was observed. Despite some of them being protected by the national regulation, none is included in the IUCN red list with a status superior to LC status. National protected species are *Philantomba walteri*, *Genetta tigrine*, *Tragelaphus scriptus* and *Chlorocebus aethiops tantalus* have been observed close to the sacred forest.

Note that *Philantomba walteri* is fully protected by the national regulation and does not belong to an IUCN threat category because there is a significant lack of data on the species. But although it is found throughout the country, it is the only species of duikers in the extreme south of the country which gives it a certain vulnerability.

Like for floristic species, no endemic or critical habitat indicator species was observed during the field investigations.

Apart from the impacts related to the Project's rights-of-way, the works will have limited impacts, especially if the site is properly managed. The impact factors during the construction phase on fauna are quite generic:

- **Land clearing operations.** These operations can cause the death of species with reduced mobility or which cannot move for behavioural or developmental reasons (juveniles, protection of the nest

and young feeding, territorial species ...) and which could not escape away from engines. Among the most sensitive species, we find species of amphibians and ground-nesting birds.

- The presence of the base camp can lead the workers, or the local population to supply the workers, to hunt bushmeat. This will increase poaching in the sector and will harm certain species. Because bushmeat consumption is limited in the study area, impact is thus limited.
- In case of uncontrolled spontaneous migration, additional significant anthropic pressure can be observed on bushmeat or other species.

The Project is not likely to disturb a significant portion of faunistic population with high ecologic values. The impact is judged minor.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### 7.4.2.2. Measures

The impacts related to the Project easement are inherent to the Project itself and its location and cannot be avoided. These impacts must be therefore compensated by a **Biodiversity management plan**. This plan is different from Biodiversity Action Plans (BAP) that might be requested by IFC PS 6 in the case of impacts on critical natural habitat. A Biodiversity management plan provides recommendation to respect local biodiversity and restore it to the extent possible, while a BAP requires that the Project does not cause net losses of valuable biodiversity and if possible creates a net gain of such biodiversity.

The biodiversity management plan will be framed with formalized measures through the drafting of an operational ESMP to be implemented by the promoter supported by a forestry company: operational ESMP based on the ESMP of this ESIA.

Regarding clearing operations:

- **limit clearing activities** and more generally the works easement, including the base camp, to the strict necessary and **clearly mark the rights-of-way**,
- **exclude the sacred forest by fencing in order to preserve it**. The fence will be installed around the forest during the construction phase. This measure allows keeping the sacred character of the forest highly important for surrounding villages (see § 7.3.3.2);

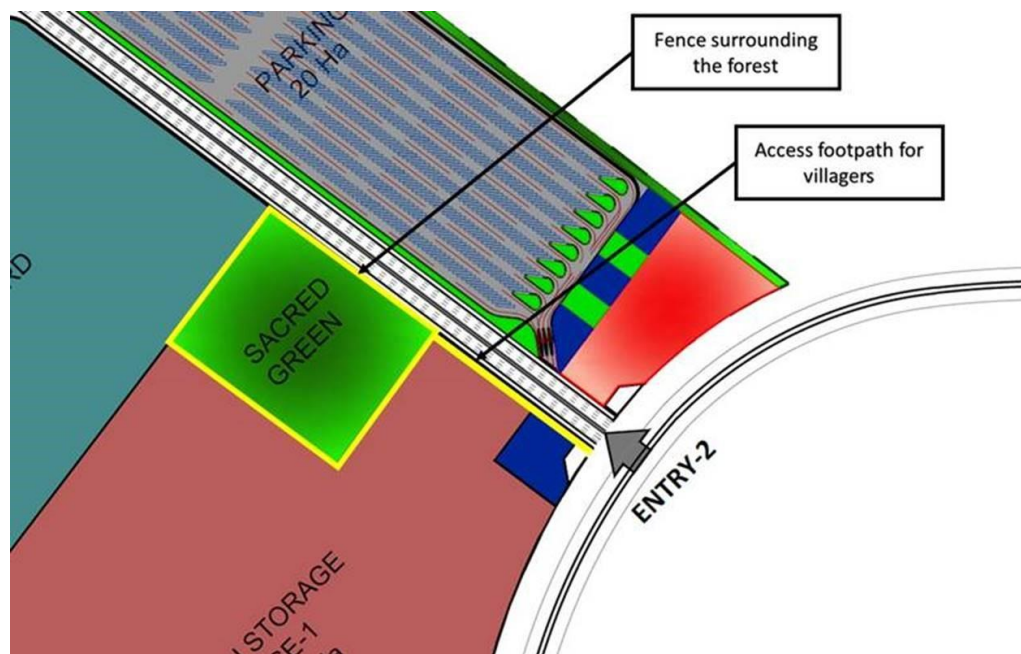


Figure 101 Sacred forest fencing

- **submit a request for land clearing permit** to the Forest Inspectorate of the Atlantic Department prior to the start of the work (see Annex IX).

In terms of works planification:

- **carry out clearing activities outside the rainy season** to reduce the risk of erosion and avoid the main period of bird reproduction. These activities should be planned between November and March;
- **recruit a forestry expert** to support the creation of the GDIZ green spaces and a green belt surrounding the Project perimeter;
- **before the clearing operations, develop a plant nursery** for the species and plants which can be used during the revegetation program of the work areas, camp site and the development of the GDIZ green spaces. 150 Ha of green spaces are already anticipated where native large canopy trees will be planted with native flowering plants and ornamental trees along the road and in the green pockets.
- **select indigenous and native** flowering plants and ornamental trees to be planted in the nursery. The ecology of ornamental trees proposed by GDIZ does not match with the environmental conditions. For example, *Anogeissus leiocarpa* is distributed from the center to the north of the country. The selection has to be based on the climatic and stationary conditions of the environment. Species to be considered are the following: Benin Mahogany (*khaya grandifoliola*), Black tamarind (*Dialium guineense*), Ebony (*Diospyros ebenum*), Shea nut (*Vitellaria paradoxa*), *Terminalia Mantaly*, Neem (*Azadirachta indica*), Silver Oak Tree (*Grevillea robusta*), etc.

In addition to measures regarding spontaneous migration detailed in section 1.1.1.1, following measures shall be applied:

- **formally prohibit hunting for all employees** from in the Project area, as well as weapons and traps within the base camp and works area;

- **formally prohibit the consumption of bushmeat** within the base camp and works area; a regular supply of animal protein will compensate the bushmeat and will be provided in the canteens / butcher / commissary of the base camp.

Regarding the management of invasive species, it will be necessary to:

- **prohibit the movement of soil and material from one region to another.** Chose, if necessary, a supply quarry near the site to limit this risk of bringing invasive species;
- before transporting the engine from / to the Project site, **clean the engine (interior and exterior) to ensure the absence of invasive plants;**
- **revegetation of works rights-of-way using only species naturally present in Benin** (indigenous) without invasive character;
- **cover the temporary storage of excavated soil with a waterproof geotextile** to limit the development of invasive species. If plants of invasive species are identified, remove and burn them.

The residual impact will be considered minor.

### 7.4.3. Impacts and measures on the human environment

During construction phase, impacts on the human environment are mostly positive, generating employment and local economic dynamism. However, construction site activities can cause a degradation in the quality of life through nuisances and pollutions, increased health and safety risks for local communities and pressure on natural resources. Women and vulnerable groups might be negatively affected by employment practices and by the presence of large numbers of workers who, themselves, will be exposed to health and safety risks on the construction site.

#### 7.4.3.1. Impacts on economic activities, livelihoods and local economy (employment)

##### Impacts

The Project will generate 2 major positive impacts:

- **Employment and contracting** during the construction phase, bringing job creation and reducing unemployment rates especially among young people. The construction phase will require the recruitment of approximately 1,000 workers for around 2 years.
- **Boost to the local economy of Tori-Bossito and Ze** through the increased consumption by site workers and contractors of goods and services produced or sold by local companies and traders.

However, these impacts might not bring the expected positive effects to the local communities for several reasons.

- **Contracting of companies external to Tori-Bossito and Ze municipalities**

During the construction phase, the promoter will mandate several contractors from various sizes and intervening in different sectors to carry out the construction works on the Project site. Contractors might also hire subcontractors to perform specific missions. The Project will therefore rely on a network of contractors and subcontractors for the provision of general services (transport, security, catering, cleaning and waste removal, etc.) and dedicated services (tree cutting, masonry, carpentry, etc.).

Because there are few to no industries and companies offering these kinds of services in the municipalities of Tori-Bossito and Ze, or because they do not meet technical and HSE requirements, and for reasons of practicality (meetings, contract negotiation and signing, contract management), the promoter could more

easily hire companies based in Cotonou which have the abilities and HSE credentials to perform these tasks.

- **Hiring of workers external to the villages surrounding Project site and Tori-Bossito and Ze municipalities**

The network of contractors will recruit most of the workforce to carry out site construction. The promoter will also recruit employees that might come from foreign countries (in this case, India) to perform highly qualified missions such as construction supervision.

Expectations towards the recruitment of local villagers during the construction are very high. In all public consultations and most interactions with the local stakeholders, they mentioned their strong wish that the young people and the farmers that will lose their land are granted top priority for recruitment.

The major risk inherent to job creation is that those affected by the Project and especially PAP, are not the main beneficiaries of these jobs but that workers coming from Cotonou or other regions of the country are hired. This risk is reinforced by the fact that the Project is set up in a rural area where inhabitants are mainly farmers, have limited education and training and might therefore not fit the job profiles and requested competencies. There is therefore a risk that workers are primarily employed from pools of human resources coming from outside of the study area.

All these aspects could generate dissatisfaction and opposition to the Project, with risks of vandalism and degradation against the facilities of the worksite.

Although the impact is positive, it is necessary to set up measures to maximise its positive effects, considering the very high expectations of the impacted communities.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
Negative	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

## **Measures**

The measures to be implemented are:

- include **clauses** on local recruitment, local sub-contracting priority and transfer of skills with local companies in the **Tender Documents** for the works;
- set up a **recruitment program** for local labor as a matter of priority, particularly those affected by the Project (PAPs) with equal skills;
- set up a **transparent procedure of call for tenders for subcontracting services**, communicated to local companies through the municipalities, district (posters, letters, meetings, etc.) or on Project site bill board if any;
- whenever possible (locally available and financially competitive) **give priority to hiring local subcontractors** coming from municipalities of Tori-Bossito and Ze;
- implement the Stakeholder Engagement Plan (SEP) and the complaint management mechanism.



### 7.4.3.2. Impacts on cultural heritage

#### Impacts

During construction and especially tree cutting and civil works, damages to the sacred forest of Anavie could occur if workers are not aware of its presence. They could cut some trees, store waste or enter the forest whereas it is not permitted.

Besides, even though there are no known archeological sites in the Project area (cf. § 6.5.4.3), some archeological artifacts (potteries, tools, building foundations, etc.) could be destroyed during earth works.

The impact is moderate.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### Measures

The following measures must be implemented:

- **marking of the forest limits with clear markers** (red ribbon or any other means deemed suitable such as wooden or metallic fences) to prevent damages to the forest. Marking will have to be done in collaboration with Anavie village authorities to ensure it is correctly performed;
- **prohibiting the use of bulldozer to proceed** with tree cutting and vegetation removal at less than 30 meters from the sacred forest;
- **awareness-raising to all workers** including subcontractors' workers, especially drivers of construction engines, about the presence of the forest and cultural rules governing it: prohibition of entry for any purpose, of tree cutting, of waste storage, etc.;
- arranging of a safe passage that must be left accessible during the works to villagers wishing to go into the forest;
- setting up a **chance-find procedure** in relation to potential archeological findings.

The residual impact will become minor.

### 7.4.3.3. Impacts on demographic balance and migrations

#### Impacts

By offering many economic opportunities, real or perceived, the Project will generate important Project-induced in-migrations, attracting rural migrants and urban youth from the municipalities of Tori-Bossito and Ze but also from the whole Atlantic Department (Cotonou, Allada, Ouidah, etc.) in the search for daily jobs along with traders or entrepreneurs seeking to develop businesses and services for the workers on the site.

It is most likely that these migrants settle themselves close to the RNIE 2 and to the Project site entrance, namely in the villages of Agbodjedo, Anavie, Djitin-Aga and Houeze. The villages of Tori-Cada district should be preserved from these influxes because they are very difficult to access and they will not be located close to the site entrance.

While these migrations might contribute to the overall economic dynamism in the Project area, they could cause indirect economic impacts such as inflation.

Besides, the social influxes may lead, in this rural context, to a deterioration in the health status of the populations because of:

- **Overload of the district health centers** of Tangbo-Djevie and Tori-Cada, which will no longer be able to provide quality care to the sick given the fact that they currently lack personnel and that medical staff already complain of overwork.
- Risk of **proliferation of various diseases** among which:
  - STDs such as syphilis, gonorrhoea, hepatitis, HIV/Aids, due to an increase in unprotected sexual interactions.
  - Communicable diseases such as respiratory ones (tuberculosis or meningitis) due to an increase in population density and promiscuity.
  - Water related diseases (*Salmonella*, *Escherichia coli*) due to unsanitary water management (consumption of polluted water and public disposal of untreated waste waters), especially in the current poor hygiene context.
- **Pressures on natural resources** such as drinking water, that could diminish the resources available to the communities in the 4 most affected villages and force households to draw water from unprotected sources.
- **Increase in alcohol consumption and development of recreational activities** (bars and discos) leading to a risk of public insecurity (brawls, fight, aggressions against women, etc.).

Some of these indirect impacts will be reinforced by the fact that the influxes will be composed of predominantly male workers (these impacts are more directly treated in the next section).

However, this impact is rated as moderate because the study area presents some resilient features: district health centres are fully functional and relatively well equipped, communicable diseases are not widespread, water is available from the water table (what poses problem is rather a lack of functioning hydraulic equipment) and there are currently no bars and discos in the villages of the study area and limited prostitution.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

## Measures

The measures to be implemented are:

- **prohibit recruitment at the gate(s)** of the construction site and set up one or several a decentralized recruitment office;
- develop a **communication plan** and an information campaign on real job opportunities to reduce opportunistic immigration;
- monitor the **settlement of newcomers** in the 8 villages of the study area with the village chiefs who will record the number of new arrivals;

- implement a **price monitoring** of a basket of local commodities (palm oil, sugar, maize, rice, gasoil, etc.) in order to identify any inflation tendency;
- monitor the health status of the population, food resources availability, water resources availability and the level of overloading of other public infrastructure through regular interviews with targeted stakeholders (district health centres, head of villages).

Due to the difficulties to tackle the negative effects of project-included in-migrations, the residual impact will remain moderate.

In the event of a deterioration of the monitoring indicators, **compensation measures** will be required. They will take the form of:

- A **targeted program to strengthen water supply infrastructure** in the 4 most affected villages of Agbodjedo, Anavie, Djitin-Aga and Houeze (through donations to adequate authorities or building of new infrastructures) in coordination with local authorities.
- A **support to public health centres** of Tori-Cada and Tangbo-Djevie through a donation of material.

In addition, it is strongly recommended, in line with IFC standards, that the promoter put in place a voluntary community development plan to support the development of the public infrastructures serving the communities surrounding the Project site (see 10.3.5).

#### 7.4.3.4. Impacts on women and gender issues

##### Impacts

During the construction phase, women are particularly exposed to the following impacts:

- limited access to employment opportunities, restricted to jobs traditionally attributed to women (cook, cleaning lady, etc.);
- exposure to sexual harassment by the site workers outside the site or on the site perimeter for female workers;
- exposure to increased domestic violence due to increased alcohol consumption caused by the psychological and social ills brought by the Project;
- encouragement to prostitute oneself due to solicitation or economic necessity;
- exclusion from village decision-making processes related to the Project.

Given the pre-existing discriminations against women in a rural setting, who are confined to their domestic life and gendered roles, and underreported gender-based violence in the study area, the impact is major.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

## Measures

The measures to be implemented are:

- respect beninese national legal framework and international standards concerning gender equality and the fight against violence made to women;
- establish **positive discriminatory measures** that will promote the employment of women on the construction site beyond jobs usually attributed to them;
- facilitate **women integration on the construction site** by setting up infrastructures dedicated to them (toilets, bathrooms, etc.);
- raise workers' awareness on gender equality, discrimination and violence against women;
- **condemn any form of gender-based violence** by site workers in the Code of Conduct, internal rules and plan and communicate on disciplinary measures for offenders;
- plan for a grievance mechanism adapted to the reception and treatment of gender-based violence;
- include women's representatives in the monitoring committee of the ESMP.

The residual impact will be minor.

### **7.4.3.5. Impacts on vulnerable groups**

## Impacts

The issue of vulnerability is central to large-scale infrastructure projects. Vulnerable populations may not be able to seize project job opportunities or achieve economic reconversion if they lose an asset such as land. They also may be easily exploited due to their discriminated position in the community and their limited capacity to defend themselves.

The implementation of the Project could worsen the current situation of vulnerable groups, especially PWDs and the elderly, without benefiting them. Indeed, this group may not have the physical ability able to work on the construction site or may not be proposed with jobs suited to their capacities. They are also subject to prejudices and discriminations that exclude them, for example, from information activities in the localities.

The recruitment of workers for the Project's needs could also lead to the employment of underage children (under the legal age of 14) by companies contracted by the Project, in a context where child labor among *vidomegons* or orphans is still widespread.

The forms of discrimination that vulnerable populations could suffer as a result of the Project are:

- the limited access to the job opportunities created by the Project;
- the risks of degrading treatment in terms of harassment, verbal and physical violence;
- the exploitation of children under the age of 14.

The impact is moderate.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### Measures

The measures to be implemented are:

- respect beninese national regulations and international standards (ILO conventions) concerning PWDs and the prohibition of child labor;
- establish **positive discriminatory measures** that will encourage the recruitment of PWDs for jobs that are suited to their abilities, and involve the Centers for Social Promotion (CPS) in the identification and mobilization of vulnerable persons, given their good knowledge of these groups;
- facilitate **PWDs integration on the construction site** by setting up infrastructures dedicated to them (access ramps, elevators, etc.);
- conduct regular controls to ensure no children under 14 are employed on the construction site;
- raise awareness among workers on the rights of vulnerable persons in the Code of Conduct;
- **condemn any form of discrimination against vulnerable persons** by site workers in the Code of Conduct and plan disciplinary measures for offenders;
- include vulnerable persons representatives in the monitoring committee of the ESMP.

Putting in place adequate measures will minimize the level of impact on vulnerable groups. The residual impact will therefore be minor.

### 7.4.3.6. Impacts on health and safety of workers

#### Impacts

On large construction sites, the health and safety of workers can be significantly affected by several major activities or situations that will cause an exposure to accidents and/or diseases:

- the storage and handling of hazardous products, particularly hydrocarbons for the site electricity system based on generators, with the risk of spills, fire, explosion and injury. Poisoning or burns to the skin or eyes when handling hazardous materials such as solvents, hydrocarbons and other chemicals may result;
- heavy road traffic on the job site with several large vehicles (excavators, bulldozers, trucks etc.) that for some have important blind spots;
- traumatic accidents caused by unsafe working conditions (joint trauma due to carrying heavy loads or manual work, fall from height/scaffolding, fall of objects, etc.);
- workers' exposure to STDs and HIV/Aids if they associate with sex workers outside their working hours;
- workers' exposure to epidemic diseases due to unhygienic conditions on the work site (lack of restrooms, water and soap for instance).



Worker's rights in terms of salary, contractual arrangement, working hours, rests, sick leave and pay, collective action, worker's union mobilization, might also not be respected by contractors.

These risks are amplified by the fact that the construction works will involve several companies working alongside through contracting and subcontracting schemes and that there will be around 1,000 workers at peak, working on the same site but for different companies. This represents an important risk in terms of HSE site supervision.

It is however moderated by the proximity of the construction site with Cotonou, which provides a wide range of hospitals and clinics able to treat emergencies, traumatic injuries and others issues very rapidly.

The impact is rated as moderate.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### Measures

The measures to be implemented are:

- include clauses on HSE requirements in the Tender Documents for the works with obligations applying to contractors and their subcontractors;
- manage the workforce and ensure working conditions in accordance with Benin's national regulations (Labor Code) and the ILO conventions ratified by Benin;
- make personal protective equipment (PPE) available to workers and ensure that they are worn;
- set up and implement a Waste Management Plan and a Hazardous Products Management Plan;
- set up and implement a Traffic and Road Safety Plan;
- set up and implement an Occupational Hygiene, Health and Safety Plan;
- recruit one or several HSE coordinator in charge of monitoring the proper application of the plans;
- implement the Stakeholder Engagement Plan (SEP) and the complaint management mechanism with a dedicated mechanism for construction workers.

After corrective measures are implemented, the level of residual risk will be minor.

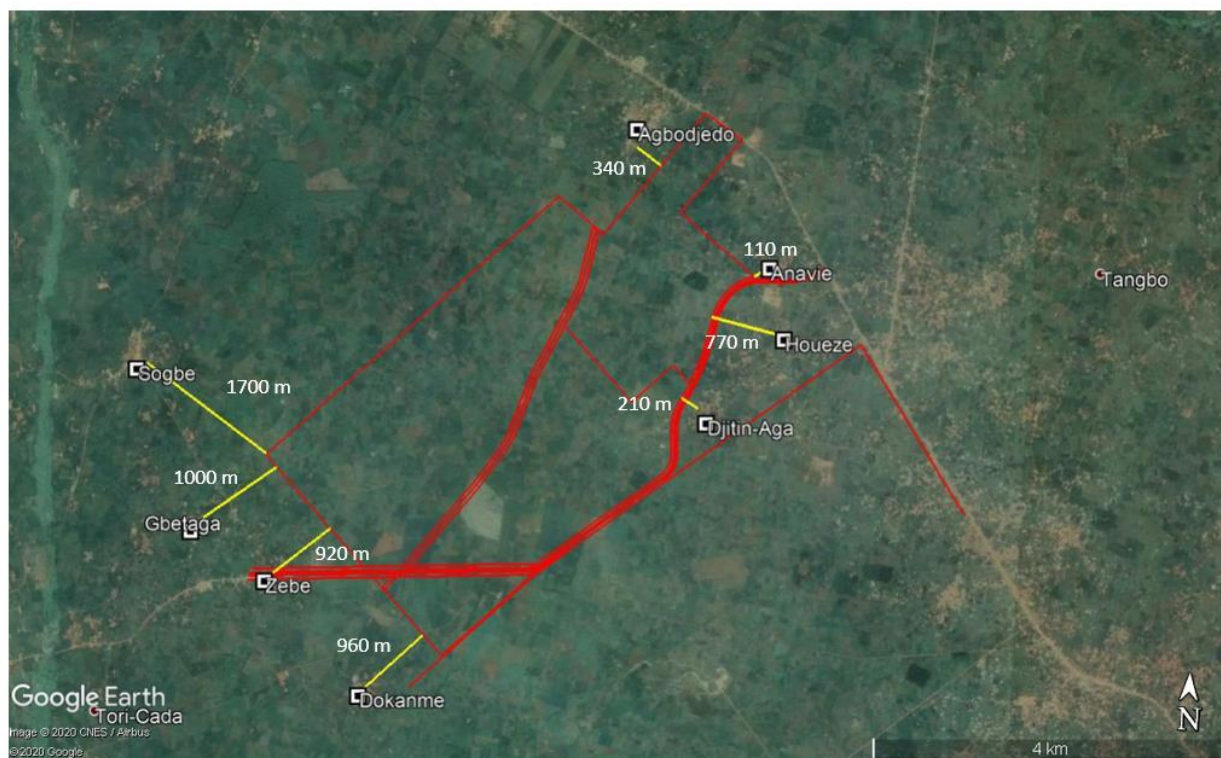
### 7.4.3.7. Impacts on health and safety of community

#### Impacts

The scheme below shows the closest villages to the Project area:

- Anavie, Djitin-Aga, Agbodjedo, Houeze in Tangbo-Djevie district are 110 to 770 meters away from the Project boundaries.
- Tori-Cada villages of Zebe, Dokanme, Gbetaga and Sogbe are further away, from 920 meters to almost 2 km.

This proximity with the Project site means that some villages, especially the ones in Tangbo-Djevie, will be directly affected by different nuisances (treated in the following sections). They will also be exposed to health and safety issues described below.



**Figure 102 Villages of the study area and their distance to the site boundaries**

**In terms of safety**, the population will mostly be exposed to the risk of road accidents. The construction site will generate significant traffic of construction vehicles going in and out the Project area. This is likely to increase the risk of accidents with local road users who use light modes of transport (motorcycle, bicycle) exposing them to more important physical damages as compared to car or truck drivers.

The Project's heavy vehicles will also pass close to homes and shops along the RNIE 2 and near Agbodjedo, which will be the crossing point for all trucks entering the construction site. The risk of collision with pedestrians and especially children will therefore be high in that particular village. This risk is reinforced by the currently limited traffic of trucks on RNIE 2 (§ 6.5.7.5.3) and by the confirmation from Tangbo-Djevie district health centres that road accidents on RNIE 2 are frequent.

**In terms of security**, the Project could be exposed to various security risks which are presented in the table below.

Potential Risks to a Project That May Require a Security Response		
More Common Risks Most projects have at least some risk of these occurring	More Serious Risks Projects in more complex security environments may face these risks	Rare, Severe Risks Few projects face such intense security risks, which typically are found only in more conflicted areas
Trespassing	Robbery	Invasion/occupation of company land or property
Vandalism	Assault	Riot
Petty theft	Armed protest	Hostage taking
Roadblock	Sabotage of company property or operations	Kidnapping
Community protests	Shooting or other use of offensive weapons	Personal or communal attacks causing fatalities (e.g., bombing, murder, etc.)

Source: (2017), *Good practice handbook, Use of security forces: assessing and managing risks and impacts*

**Figure 103 : Various security risk levels**

In the case of GDIZ, the risks are mainly listed in the first column due to the peaceful situation in Benin as of 2020. Thus, the construction site will be exposed to the potential trespassing of individuals for various reasons (site crossing, wandering animal recovery, theft, degradation or sabotage of equipment) that could lead to accidents such as fall from height or limb crushing and to material losses for the Project.

To prevent these intrusions, the main contractor will have to deploy a site security system which could lead to security risks for communities if the guards engage in excessive force, for exemple during a community protest against the Project or after a sabotage.

**In terms of health**, the population is mainly exposed to the risks of the spread of HIV/Aids and sexually transmitted diseases (STDs). Indeed, construction work will require a large male workforce and will attract many job seekers. This large number of arrivals in the study area will lead to the development of prostitution and relations between workers and local populations, which could facilitate the spread of STDs and HIV/Aids. This risk is all the more important because, in general in Benin, knowledge of HIV/Aids and its means of prevention is said to be declining among both men and women, who remain less well informed than men, particularly about the modes of transmission of the disease.

Moreover, the presence of a large number of workers, if they do not have sufficient latrines and defecate in the bush, could lead to pollution of the water table and rivers by faecal matter, resulting in a proliferation of gastrointestinal diseases. This risk is high because villagers mostly rely on the superficial water table for their drinking water needs.

In addition, this large number of workers could also facilitate the development of epidemic outbreaks (typhoid fever, meningitis, tuberculosis) on the construction site that could spread to local populations.

The impact remains however moderate, because of the availability of district health centres and the close proximity of the Project area with Cotonou where numerous health facilities are available.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### Measures

The measures to be implemented are:

- set up and implement an **Occupational Hygiene, Health and Safety Plan**;
- set up and implement a **Traffic and Road Safety Plan** that considers local communities;
- deploy a 24/7 guard system for the various work zones;
- implement site access controls (badges with identification) with one or more vehicle checkpoints;
- set up and implement a **Security personnel management plan**;
- organize **awareness campaigns** in villages in the study area on hygiene measures to be respected;
- deploy an awareness program for villagers on road risks and the safety measures required;
- set up and implement a program to raise awareness among the local population of the risks of contamination by STDs and HIV/Aids through an NGO with expertise in the field.

The residual impact will be considered minor.

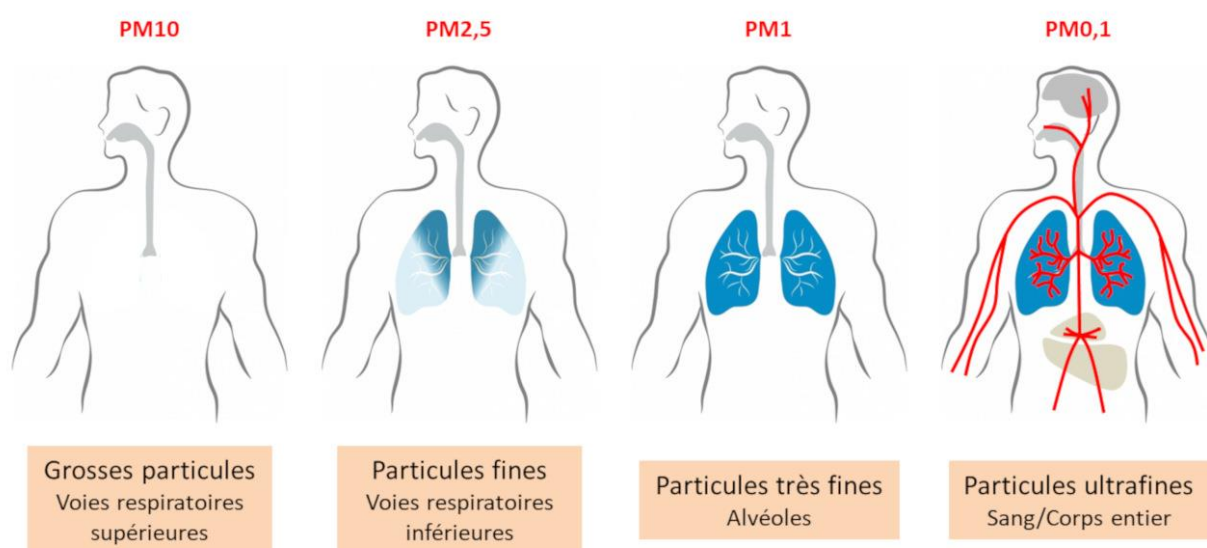
### 7.4.3.8. Impacts on air quality and noise

#### Impacts

The movement of machinery and vehicles and the functioning of construction site installations (generators or concrete mixers) will produce air emissions mostly composed of **dust particles** and, to a lesser extent, **olfactory emissions** (exhaust gas).

Dust particles will also be caused by the stripping of top soil, soil excavation, soil handling and storage and might settle on the vegetation and houses. Olfactory emissions could be caused by bitumen production, degradation and putrefaction of organic wastes, odors from the latrines and restrooms of the workers, etc.

Large dust particles can affect upper respiratory tracts while finer particles can infiltrate the lungs and blood, as shown on the picture below. Olfactory emissions could trigger discomfort among residents.



Source: Encyclopédie de l'Environnement

Figure 104 Penetration of dust particles in the respiratory system

Because the construction works are located in a rural area where this type of emissions is currently non-existent (cf. § 7.4.1.1 and 7.4.1.2), works will generate **nuisances for the populations living in the vicinity of the construction site, particularly those in the villages of Agbodjedo, Djitin-Aga and Anavie, which are the closest to the construction site.**

However, because the baseline conditions for air quality and noise are good, this impact will remain minor.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

## Measures

The measures proposed are to:

- apply measures developed in § 7.4.1.1 and 7.4.1.2;
- locate working zones (workshops) far from any house;
- avoid noisy work during off-duty hours;
- limit the speed of trucks to 30 km/h in all populated areas;
- use good quality vehicles, preferably new, with engines in good condition;
- work with equipment that meets the required standards in terms of noise emissions.

The residual impact will be considered negligible.



#### 7.4.3.9. Impacts on water resources

##### Impacts

During the construction phase, the use of water during the works will be mainly for washing vehicles and construction equipment and for worker's consumption. Water needs might therefore be important, considering the surface of the works and the number of workers involved at peak period (1,000).

The impact is nevertheless minor given the abundance of water resources in the study area.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

##### Measures

The measure developed in 7.4.1.3.2 are enough to manage this impact.

The residual impact will be considered negligible.

#### 7.4.4. Impacts and measures synthesis for the construction phase

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
Climate, air quality and noise	Atmospheric emissions from works	Smoke and greenhouse gas emissions from construction machineries, compressors and electricity generators and green waste burning		<ul style="list-style-type: none"> <li>-Waste reuse, composting and recycling.</li> <li>-Burning waste is strictly forbidden</li> </ul>	
				Use of good quality equipment and vehicles / regular inspection and maintenance.	
	Atmospheric emissions from traffic	Dust emissions earthmoving operations, storage of excavated materials and products, material crushing units and the concrete plant. During dry period this impact is higher		<ul style="list-style-type: none"> <li>Limit the vehicles speed in inhabited area (30 km/h)</li> <li>-Humidification of roads / soil stored when necessary</li> <li>-Covering trucks transporting pulverulent materials</li> <li>-Dust monitoring</li> </ul>	
	Noise from civil works, including traffic & drilling	<ul style="list-style-type: none"> <li>- Earthworks, concrete and asphalts fabrication, construction activities &amp; traffic will be the main source of noise</li> <li>- Project location in an area where activities generating noise are low: increase of level of noise compared to the baseline conditions</li> </ul>		<ul style="list-style-type: none"> <li>-Limit construction works to daytime hours where reasonable and feasible</li> <li>-Using equipment that has been well maintained</li> <li>-Construct physical noise barriers around main the main source of noise</li> <li>-Transportation vehicles should maintain appropriate travelling speeds</li> <li>-Noise monitoring on a quaterly basis</li> </ul>	
Hydrology and hydrogeology	Effluents discharges (normal mode) and waste production from workers accommodation	Wastewater discharges/waste leachate into groundwater and surface water (mainly suspended solids, organic matter and bacteria). Discharges causing a deterioration in the quality of the natural environment (lack of oxygen, turbidity)		<ul style="list-style-type: none"> <li>-Implementation of wastewater treatment systems</li> <li>-Water quality monitoring program from worksite areas</li> </ul>	

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
		-Impact both on the environment but also on public health with the risk of epidemic development -Impact on surface water is limited because of no presence of sensitive aquatic ecosystem		Implementation of collection, monitoring and waste treatment plan	
	Effluents discharges (normal mode) from work area	-Release into groundwater from washing water of engines and equipments - including asphalt plant and concrete mixer (lack of oxygen, turbidity, chemical pollution) -Impact on surface water is limited because of no presence of sensitive aquatic ecosystem		-Identification of appropriate place for chemicals and dangerous products storage -Appropriate storage for dangerous products -Identification of appropriate place for engine refuelling, maintenance and washing	
	Effluents discharges (degraded mode) linked to the storage area / dangerous products handling	-Potential risk of leaks and accidental spillage of hazardous products (hydrocarbons, chemicals, hazardous waste, etc.) on the ground: contamination of groundwater by infiltration -Significant risk to human health in the event of consumption of polluted water; acute toxicity to aquatic life		Develop an emergency plan in case of accidental spillage	
	Land clearing	Heavy rainfall on poorly cohesive materials increased water turbidity following runoff on bare soil. Soil leaching can go until the Lama river through the longitudinal depression, but no hydraulic connexion was observed during the rainy season		Stripped soil management Main excavation work shall be conducted during dry periods	
	Water consumption for workers and works	Concrete production, vehicles washing, tracks humidification and domestic use, etc will consume water, around 31 680 m <sup>3</sup> for the overall works activities.		Water supply with bottle and tank with rainwater collection (linked to a rainwater collection system)	

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
	Hydraulic patterns	-Land clearing, earthworks and soil storage: can disturb the initial hydraulic patterns -Impact limited because of the main scheme of hydraulic patterns will be maintained.		Selection of porous asphalt	
Geology, topography and soil	Effluents discharges (normal and degraded mode) & waste production	-Impacts on soil quality and groundwater of unconfined aquifer (indirect impact)		See above measures regarding water quality.	
	Earthworks	-Large volumes of non-reusable excavation products will be stored permanently, which could lead to landslides causing erosion and sedimentation -Temporary soil disturbance on base & work camps		-Stripped soil management -Optimization of cut and fill -Implementation of silt fence -Progressive soil rehabilitation	
Landscape	Management of the area linked to works (Project area, work base and base camp)	Visual degradation in case of poor management of the site perimeter / work base / base camp perimeters		Implementation of collection, monitoring and waste treatment plan	
All above items	Waste production	-Production of domestic waste (0,88 m <sup>3</sup> /d), green waste (1,441,63 ha to be cleared), inert waste and dangerous waste from work area and base camp -Possible impacts come from poor waste management, especially for domestic and hazardous waste, and the burning of green waste		Act with the Government, the need to develop a landfill site in close vicinity of the site or to expand the existing landfill. If new landfill, ensure the government planned a dedicated ESIA.	
				Identify recognized beninese companies in order to regularly collect and treat recyclable and specific waste (hazardous).	

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
				-Implementation of collection, monitoring and waste treatment plan -Submit a request for waste transport to Authorities	
Habitat and vegetation	Affected land occupation	Agricultural formations and bare soil are the most impacted area by the Project with 1,450 ha, or 99% of the area. Natural vegetation only occurs on 11,7 Ha Area impacted by the Project are highly affected by human activities and present no major ecologic sensitive issues		-Implement before the clearing operations a plant nursery -Selection indigenous and native flowering plants and ornamental trees -Recruit a forestry expert to support the revegetalisation program and the GDIZ green spaces -Submit a request for land clearing permit to Authorities	
	Loss of habitats	Loss of: * Terrestrial modified habitat: 1.450,3 ha, or 99,2% of the Project area: no ecologic values and common in the area * Terrestrial natural habitat (including a temporary pond during the rainy season): 11,7 ha, or 0,8% of the Project area: medium ecologic diversity, especially in the sacred forest, also affected by human perturbation		-Limit clearing activities and clearly mark the rights-of-way. -Prohibit the movement of soil and material from one region to another.	
	Loss of ecologic floristic richness	Clearing activities on site: loss of the 156 species recorded during dry and rainy season with no endemic or critical habitat indicator species 2 species VU in global IUCN red list, and 1 VU & 1 EN in Benin IUCN red list → <i>Triplochiton scleroxylon</i> observed in the sacred forest. Large distribution but issues at Benin level because of anthropogenic pressures Several species already observed on site. he consequences of the introduction of invasive species vary depending on the species introduced		-Exclude the sacred forest by fencing in order to preserve it Clean the engine to ensure the absence of invasive plants -Revegetation of works rights-of-way using only species naturally present in Benin -Cover the temporary storage of excavated soil with a waterproof geotextile to limit the development of invasive species	



Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
		and the ability of the environment to regulate them		Carry out clearing activities outside the rainy season	
	Loss of ecologic faunistic richness	Conversion of a few hectares of forest and shrubland into a modified zone is not likely to modify the populations of mobile fauna which have not saturated its environment. Several species of birds and mammals protected by the national regulation were observed, but none has a IUCN status higher than LC status. Several clues indicate that the site is a nesting area for several bird species, including ground-nesting birds.			
	Uncontrolled spontaneous migration	Additional significant anthropic pressure can be observed on bushmeat or on useful wood species as energy sources and building materials and the need for farmland (new land to be cleared) Impact limited for bushmeat due to their limited presence		-Formally prohibit hunting for all employees -Formally prohibit the consumption of bushmeat	

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
Economic activities, livelihoods and local economy (employment)	Employment	<ul style="list-style-type: none"> <li>-Employment and contracting during the construction phase, bringing job creation and reducing unemployment rates</li> <li>-Boost to the local economy through the increased consumption by site workers and contractors of goods and services produced by local companies</li> </ul>		<ul style="list-style-type: none"> <li>-Set up a recruitment program for local labor as a matter of priority, particularly those affected by the Project (PAPs) with equal skills</li> <li>-Set up a transparent procedure of call for tenders for subcontracting services, communicated to local companies through the municipalities, district (posters, letters, meetings, etc.) or on Project site bill board if any</li> <li>-Whenever possible (locally available and financially competitive) give priority to hiring local subcontractors coming from municipalities of Tori-Bossito and Ze</li> </ul>	
				<ul style="list-style-type: none"> <li>-Include clauses on local recruitment, local sub-contracting and transfer of skills with local companies in the Tender Documents for the works</li> <li>-Implement the Stakeholder Engagement Plan (SEP) and the complaint management mechanism</li> </ul>	
Cultural heritage	Civil works, including access road & drilling	<ul style="list-style-type: none"> <li>-Potential damages to the sacred forest of Anavie during the works</li> <li>-Damages to potential archeological artefacts buried in the soil during excavation and soil works</li> </ul>		<ul style="list-style-type: none"> <li>-Marking of the forest limits with clear markers (red ribbon or any other means deemed suitable) to prevent damages to the forest.</li> <li>-Marking will have to be done in collaboration with Anavie village authorities to ensure it is correctly performed</li> <li>-Prohibiting the use of bulldozer to proceed with tree cutting and vegetation removal at less than 30 meters from the sacred forest;</li> <li>-Awareness-raising to all workers including subcontractors' workers, especially drivers of construction engines, about the presence of the forest and cultural rules governing it</li> <li>-Arranging of a safe passage that must be left accessible during the works to villagers wishing to go into the forest</li> <li>-Setting up a chance-find procedure in relation to potential archeological findings</li> </ul>	

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
Demographic balance and migrations	Employment Uncontrolled spontaneous migration	Project-induced in-migrations, attracting rural migrants and urban youth from the municipalities of Tori-Bossito and Ze but also from the whole Atlantic Department (Cotonou, Allada, Ouidah, etc.) in the search for daily jobs		<ul style="list-style-type: none"> <li>-Develop a communication plan and an information campaign on real job opportunities to reduce opportunistic immigration</li> <li>-Monitor the settlement of newcomers in the 8 villages in the study area with the village chiefs who will record the number of new arrivals</li> <li>-Implement a price monitoring of a basket of local commodities in order to identify any inflation tendency</li> <li>-Monitor the health status of the population, food and water resources availability and the level of overloading of other public infrastructure through regular interviews with targeted stakeholders</li> </ul> <p><b>Compensation:</b></p> <ul style="list-style-type: none"> <li>-Targeted program to strengthen water supply infrastructure (through donations to adequate authorities or building of new infrastructures) in coordination with local authorities</li> <li>-Support to public health centres of Tori-Cada and Tangbo-Djevie through a donation of material</li> </ul>	
				Prohibit recruitment at the gate(s) of the construction site and set up one or several a decentralized recruitment office	
Women and gender issues	Employment	<ul style="list-style-type: none"> <li>-Limited access to employment opportunities restricted to jobs traditionally attributed to women (cook, cleaning lady, etc.)</li> <li>-Exposure to sexual harassment by the site workers outside the site or on the site perimeter for female workers</li> <li>-Exposure to increased domestic violence due to increased alcohol consumption due to stress or social ills brought by the Project</li> <li>-Encouragement to prostitute oneself due to solicitation or economic necessity</li> <li>-Exclusion from village decision-making processes related to the Project</li> </ul>		<ul style="list-style-type: none"> <li>-Respect beninese national legal framework and international standards concerning gender equality and the fight against violence made to women</li> <li>-Establish positive discriminatory measures that will promote the employment of women on the construction site beyond jobs usually attributed to them</li> <li>-Facilitate women integration on the construction site by setting up infrastructures dedicated to them</li> <li>-Raise workers' awareness of gender equality, discrimination and violence against women</li> <li>-Condemn any form of gender-based violence by site workers in the Code of Conduct and plan disciplinary measures for offenders</li> </ul>	

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
				<ul style="list-style-type: none"> <li>-Implement a grievance mechanism adapted to the reception and treatment of gender-based violence</li> <li>-Include women's representatives in the monitoring committee of the ESMP</li> </ul>	
Vulnerable groups	Employment	<ul style="list-style-type: none"> <li>-Limited access to the job opportunities created by the Project</li> <li>-Risks of degrading treatment in terms of harassment, verbal and physical violence</li> <li>-Exploitation of children under the age of 14</li> </ul>		<ul style="list-style-type: none"> <li>-Respect beninese national regulations and international standards (ILO conventions) concerning PWDs and the prohibition of child labor</li> <li>-Establish positive discriminatory measures that will encourage the recruitment of PWDs for jobs that are suited to their abilities</li> <li>-Facilitate PWDs integration on the construction site by setting up infrastructures dedicated to them</li> <li>-Conduct regular controls to ensure no children under 14 are employed on the construction site</li> <li>-Raise awareness among workers on the rights of vulnerable persons in the Code of Conduct</li> <li>-Condemn any form of discrimination against vulnerable persons by site workers in the Code of Conduct and plan disciplinary measures for offenders</li> </ul>	
				<ul style="list-style-type: none"> <li>-Include vulnerable persons representatives in the monitoring committee of the ESMP</li> </ul>	

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
Health and safety (workers)	Civil works Traffic Atmospheric emissions Solid waste production Liquid discharge production	Exposure of construction site workers to accidents and diseases caused by various factors		<ul style="list-style-type: none"> <li>-Manage the workforce and ensure working conditions in accordance with Benin's national regulations (Labor Code) and the ILO conventions ratified by Benin</li> <li>-Make personal protective equipment (PPE) available to workers and ensure that they are worn</li> <li>-Set up and implement a Waste Management Plan and a Hazardous Products Management Plan</li> <li>-Set up and implement a Traffic and Road Safety Plan</li> <li>-Set up and implement an Occupational Hygiene, Health and Safety Plan</li> <li>-Recruit one or several HSE coordinator in charge of monitoring the proper application of the plans</li> </ul>	
				<ul style="list-style-type: none"> <li>-Include clauses on HSE requirements in the Tender Documents for the works with obligations applying to contractors and their subcontractors</li> <li>-Implement the Stakeholder Engagement Plan (SEP) and the complaint management mechanism with a dedicated mechanism for construction workers</li> </ul>	
Health and safety (community)	Civil works Traffic Atmospheric emissions Solid waste production Liquid discharge production	Exposure of local community members to accidents and diseases caused by the presence of the construction site: <ul style="list-style-type: none"> <li>- Road accidents</li> <li>- Accidents due to site trespassing</li> <li>- Use of excessive force by site security personnel</li> <li>- Exposure to communicable diseases, especially STDs and HIV/Aids</li> </ul>		<ul style="list-style-type: none"> <li>-Set up a Traffic and Road Safety Plan that considers local communities</li> <li>-Set up and implement Occupational Hygiene, Health and Safety Plan</li> <li>-Deploy a 24/7 guard system for the various work zones; Implement site access controls (badges with identification) with one or more vehicle checkpoints</li> <li>-Set up and implement a Security personnel management plan</li> </ul>	



Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
		- Exposure to unhealthy environment due to hygiene practices on the construction site		-Deploy an awareness program for villagers on road risks and the safety measures required -Organize awareness campaigns in villages in the study area on basic hygiene measures to be respected -Set up a program to raise awareness among the local population of the risks of contamination by STDs and HIV/Aids through an NGO with expertise in the field	
Air quality and noise	Traffic Atmospheric emissions	Nuisances caused by air emissions and noise affecting the populations living in the vicinity of the construction site, particularly those in the villages of Agbodjedo, Djitin-Aga and Anavie, which are the closest to the construction site		-Locate working zones (workshops) far from houses and villages -Avoid noisy work during off-duty hours -Limit the speed of trucks to 30 km/h in all populated areas; -Use good quality vehicles, preferably new, with engines in good condition -Work with equipment that meets the required standards in terms of noise emissions	
Water resources	Resources consumption (energy, water)	Water consumption for works, mainly for washing vehicles and construction equipment and for human consumption		Water supply with bottle and tank with rainwater collection (linked to a rainwater collection system)	

## 7.5. Impacts and measures in the operational phase

### 7.5.1. Impacts on the physical environment and mitigation measures

#### 7.5.1.1. Impacts on climate and air quality

##### Impacts

During the operational phase, the sources of atmospheric emissions will be found mainly at the various production units of the future industries located in the industrial zone. These units are not known to date. Each of these industries will have to assess the impacts resulting from its atmospheric emissions in a dedicated ESIA.

The atmospheric emissions will come from the combustion of thermal engine such as:

- **Vehicles:** vehicles of GDIZ employees, but also all other employees of the area, residents, visitors, delivery trucks, etc.
- **Electric substations:** 2 substations and 12 zonal switching stations will be managed by GDIZ. Substations may be at the origin of release of SF<sub>6</sub><sup>12</sup> (sulfur hexafluoride) gas mainly during maintenance and removal of equipment, or leakage from equipment in operation. SF<sub>6</sub> is used as an electrical insulator in high-voltage equipment.
- **Emergency generators,** as diesel engines, are expected to release GHG such as Nitrogen Oxide (NO<sub>x</sub>), Carbon Monoxide (CO) and particulate matter (PM). Due to the very punctual use of these equipment, significant emissions from them are not expected and will be considerably lower than those from traffic.
- **Landfill:** food that has been wasted and left to rot away on landfill makes up 34% of all methane gas emissions. Methane gas is almost twenty times more damaging to our environment than carbon. Landfills are the second largest human source of methane. Methane gas, once released, rises in our atmosphere where it sits and keeps hot air from escaping, causing the planet to warm very quickly. As food and biodegradable waste is expected to be the first type of waste produced in the GDIZ area (see section 4.3.1.3), methane emissions can non-negligible.

The only way to efficiently recycle food waste without harming the environment is to compost it. Composting doesn't require any significant power, does not release any foul by-products and, more importantly, only generates low levels of carbon dioxide. For the GDIZ Project, 2 compost trenches will be developed in order to manage this biodegradable waste.

Thanks to the roads coating, dust emissions will also be largely reducing.

Therefore, the impact is deemed minor.

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<sup>12</sup> SF<sub>6</sub> is a potent greenhouse gas; over a 100-year period, SF<sub>6</sub> is 23,900 times more effective at trapping infrared radiation than an equivalent amount of carbon dioxide. SF<sub>6</sub> is also a very stable chemical, with an atmospheric lifetime of 3,200 years.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### Measures

Because the large part of vehicle fleet will be not under GDIZ control, no reduction measure for vehicles GHG emissions can be applied.

The measures to be implemented are:

- **Obligation to fulfil a dedicated ESIA for each industry** establishing in the area. Impacts and measures related to atmospheric emissions shall be studied and assessed appropriately at this level.
- Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector.
- **Routine maintenance checks** will be undertaken regarding electric substations and emergency generators. Especially for the equipment using SF6 gas that has to be done properly and periodically in accordance to the specification and operation manuals.
- As there is no available alternative to ban SF6, the judicious use of SF6 with **careful closed-loop handling and full recycling upon equipment retirement** must be privileged.
- **Application of the decree n°2001-110 of 4 April 2001** relating to the atmospheric emissions of fixed sources.

The residual impact is considered negligible.

### 7.5.1.2. Impacts on the environmental noise

#### Impacts

During operation, noise will mostly be generated by the various industries settled in GDIZ and come from the operation of the machinery and industrial equipment present at each industrial unit. As the industrial processes of these units are not yet known, potential noise levels can not be properly assessed.

An important source of noise will also come from traffic. GDIZ common utilities are not expected to create noise emissions, except electrical substations. But as these substations are located in the industrial area far away from residential area, the impact is not significant.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### Measures

Since the large part of vehicles will be not under GDIZ control, no reduction measure for vehicles noise emissions can be applied.

The measures to be implemented are:

- **Obligation to fulfil a dedicated ESIA for each industry** establishing in the area. Impacts and measures related to noise emissions shall be studied and assessed appropriately;
- Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector;
- Speed limit in line with the road's classification in the Project masterplan.
- Acoustically isolate the electrical substation.

Impacts are judged negligible.

### 7.5.1.3. Impacts on hydrology and hydrogeology

#### 7.5.1.3.1. Impacts and measures on water quality

##### Impacts

Various activities of GDIZ may lead to water degradation due to contaminant that may be discharged, both in normal and degraded mode. Impacts on water quality mainly concern groundwater through ground infiltration as no surface water is present in the GDIZ. These impacts may come from:

- Stormwater from general roof and parking areas that will discharge in the drain system without waterproof membrane (normal mode);
- Stormwater from areas with oily process operations will be drained and discharged in the drain system without waterproof membrane (normal mode);
- Stormwater from waste storage areas will be drained and discharged in the drain system without waterproof membrane (normal mode);
- Effluents from the treatment plants will be discharged in the central drain (normal mode);
- Accidental events could lead to an accidental spillage of hazardous products or a release of untreated wastewater, seeping through the ground to contaminate the water (degraded mode);
- Non-treated effluents from the treatment plants might discharge to central drain (degraded mode).

In GDIZ, domestic sewage is proposed to be treated in a domestic sewage treatment plant (STP). Industry effluent will be treated in common effluent treatment plant (CETP). **The industrial units are expected to undertake preliminary treatment** within the industrial premises prior to discharge of wastewater to the common conveyance system. After treatment the effluent will be discharged into the central drain. GDIZ will have to ensure that the effluent is treated to the disposable standards before it is discharged.

Nevertheless, it is expected that 10,336.89 m<sup>3</sup> of treated effluent will be discharged in the central drain per day. In dry season, when the central drain will be dried, only the treatment plants will discharge water. As there will be no other source of water, there is a high risk of standing water with no possibility of dilution for the discharges of the treatment plants. This impact can be higher in case of malfunctioning of the treatment plants or the industrial preliminary treatment.

This could imply nuisances (odour), potential pollution and development of disease vectors.

To date, the “natural central drain” gathers runoff during the rainy season but no superficial flow is observed both in dry and rainy season. There seems to be no hydraulic connexion between this depression and the Lama river downstream. Thanks to that no impact is expected on the Lama river.

Since the design and process of the treatment plants, the quality level of inflows authorized, the discharges management and the industrial effluents characteristics are unknown, impact is qualified as moderate.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
Negative	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### Measures

- **Definition, for all industrial units, of effluent requirements to be accepted in the CETP.** A set of parameters and their level of concentration will be prescribed at every stage of treatment and industrial units must comply to meet the preliminary treatment standards.
- All industrial premises, **prior to discharge of wastewater to the common conveyance system, have to undertake preliminary treatment.** An impact assessment of their effluents on the environment must be conducted.
- **Obligation to fulfil a dedicated ESIA for the treatment plants** established in the area by GDIZ. Impacts and measures related to discharges management shall be studied and assessed appropriately.
- Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector.
- Submit appropriate request to the Environment Ministry to **obtain an operating permit for wastewater discharges** (see Annex IX).
- Stormwater from areas with oily process operations will be drained through oil interceptors before being discharged to drain without waterproof membrane.
- Each outfall location that discharge runoff into the central drain / subdrains must be **equipped with grates or nets** to stop the debris and, other solids entering the central drain.
- **Development of an emergency plan** in case of accidental spillage or other kind of accident on site.

To date, without additional information regarding the wastewater discharges, impact is still considered as moderate.

#### 7.5.1.3.2. Impacts and measures on water resources

### Impacts

During operational phase, water needs have been estimated. Industrial grade water i.e. underground water (without treatment) will be supplied for industrial needs and potable water with drinkable standards (with treatment) will be supplied for residential and commercial users.

The water requirement for different landuse's based on their consumption rate has been determined. The total water demand is estimated at 18,000 m<sup>3</sup> per day as described in the 4.3.1.2.1.



The water source for the Project will be groundwater that will be extracted through borewells. The size and depth of the borewell depend on the hydro-geological conditions prevailing at the Project area that ultimately governs the yield expected from each of the borewells.

Based on the "Soil Lithography and hydro-geological" data available for Benin, the salient hydrogeological features in relation to the Project is described below (Source of information: Hydrogeological Map of Benin, edition January 2012):

- The study involved drilling of 200 borewells. The depth of borewells ranges from 30 to 150m;
- Age of the soil strata/aquifer: the Project area falls within Mio-Pliocene aquifer;
- Lithology characteristics: Sand, conglomeratic or clay sand;
- Groundwater level: 48m;
- Average discharge: 9.3 m<sup>3</sup>/h;
- Success rate: 98% and
- Development potential of ground water: Favourable.

With regards to the large volume required by GDIZ, there is a potential risk of pressure decrease of the deep reservoir during production, which could result in decreasing piezometric levels in the shallow aquifer if the 2 aquifers are hydrologically connected (shallow aquifer is the one mainly used by villagers). The main potential impact being a reduction in spring/borehole flows leading in conflicts for access water.

Moreover, in case this aquifer is connected with surface water as Lama river, disruption in its hydrologic functioning could be observed.

But as no hydrogeological study has been conducted, the aquifer dynamics, the volume available of the resources, its recharging capacity, its interannual variation (depending on the season) and its current uses are not known. Hence, the impact of the operational GDIZ activities on water resources can not be assessed.

Drilling operation might be also a significant impact, particularly given the number of predicted boreholes. Several impacts could be caused by these activities, as noise, sludge production, water contamination, etc and have to be assessed.

Without additional information, the impact is rated as moderate.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### Measures

In order to define appropriate water management measures, the first step is to develop a **hydrogeological study including an operation modelling of the water resources**.

Based on the results, measures will be defined and integrated into the water supply management of the GDIZ. Moreover, drilling activities will have to be assessed and managed appropriately.

In every case, water consumption monitoring must be implemented for the entire GDIZ, including all activities, industrial, residential and commercial areas.

A request submission to the Environment Ministry must be made to **obtain an operating permit for groundwater withdrawal and drilling**. The implementation of a groundwater borehole is subject to an environmental impact study (EIA). The Beninese Environment Agency sees to its realization at the expense of the applicant. The permit applicant must therefore provide documents certifying that an EIA has been carried out (see Annex IX).

Without additional information, the residual impact is rated as moderate.

#### **7.5.1.3.3. Impacts and measures on hydraulic pattern**

##### **Impacts**

Initially, vegetation (natural or agricultural) covers the area, favouring evapo-transpiration and water ground infiltration. Thanks to this, runoffs are low, including during rainy season and no superficial flow is observed on site in the longitudinal depression and downstream.

The natural hydraulic pattern has been taken into account for the GDIZ development. As the site gradient is gentle, the road network was designed in the direction of slope, so that all the gravity networks can be designed efficiently and water flows leading towards the central depression. No disturbance on the initial hydraulic scheme will be observed.

Nevertheless, the GDIZ development will increase the soil sealing and hence limit natural water infiltration, especially during the rainy season where heavy rainfall can cause flooding. The design plans propose to manage stormwater with a network of drains, vegetated channels to transport and infiltrate rainwater, associated to ponds and infiltration basin in order to temporarily store stormwater runoff, reduce peak flow rates and favour water infiltration. It is expected that the introduction of green concepts would reduce the surface runoff speed and volumes and its effects on the downstream areas

Eventually, the remaining runoff will be led to the central drain.

The stormwater strategy is illustrated in the figure below.



(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Figure 105 Storm water management strategy**

To date, detailed technical studies regarding the design of the stormwater network, including the central drain are not yet available. The ratio of infiltrated water in ground versus water discharged in the central drain is unknown to date, as well as the finality of the water the drain contains. In case of heavy rainfall and due to the future soil sealing, important volume of water could be discharged in it, with the flow draining downstream following the natural topography.

The central drain is a natural valley passing through the Project area, which is currently receiving the inflows/ runoff from its catchment. Thanks to the natural vegetation initially present, no superficial runoff / stagnant waters were observed in this depression, including in rainy season. Besides, the absence of typical wet vegetation confirms it.

After the Project is developed, it is expected that the runoff volumes will be more important than the pre-development ones. Depending on the water gathered by the central drain, these superficial flows can cause flooding downstream where inhabited areas and crops exist.

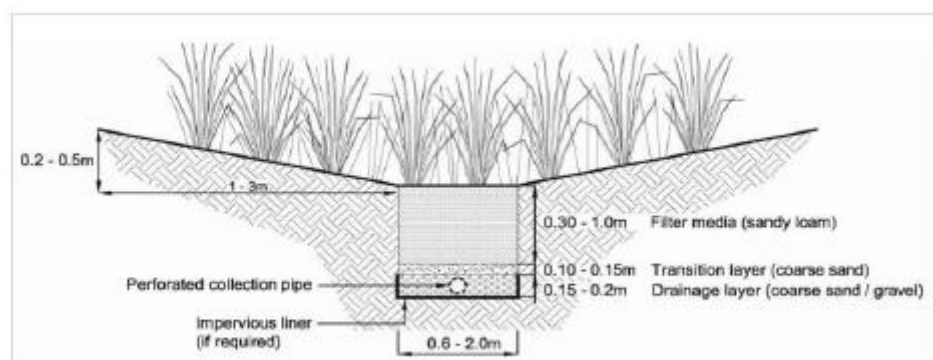
It is understood that the area south of GDIZ is being developed as an airport as well as an industrial and logistic hub. It is therefore likely that the government has planned for greater level storm water management. However, the matter must be brought to the notice of the government administration to take all necessary measures to ensure efficient drainage of the area.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

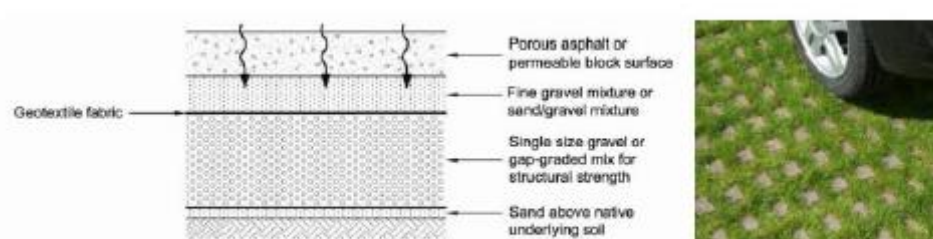
### **Measures**

Additional technical studies must be conducted in order to estimate the operational phase runoff volumes and flows and to assess properly the impacts downstream of the central drain:

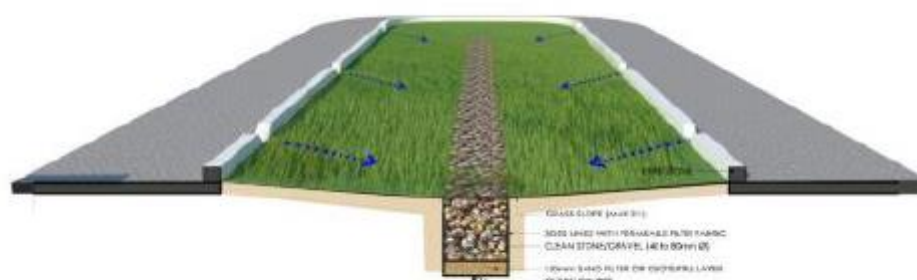
- **Develop and implement, as per Master plan, a design that reduced runoff volume**, such as vegetation swale (vegetated channel area to transport and infiltrate rainwater) on both sides of the utility corridor along all the roads, permeable paving in the parking area and infiltration trenches within the plot premises.



**Vegetated swale with collection pipe and filter media**



**Permeable paving or Modular pavement**



**Infiltration trench**

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

**Figure 106 Design concept to reduce runoff volume**

- **Conduct a hydraulic study**, including the efficiency of runoff schemes in relation with the design developed to minimize the impacts of urban runoff.

**Discuss with the government about the overall stormwater management of the area.** As the development of this area is planned in several years, temporary solutions must be found in order to minimize flooding impacts on the populations in the downstream area.

If despite these measures, an impact becomes likely, with loss of additional crops or other infrastructures downstream of the central drain, appropriate measures (especially compensation measures, see § 7.5.3.1) will have to be considered and implemented.

To date, without additional information regarding the runoff volume, the impact is still considered as moderate.



#### 7.5.1.4. Impacts on geology, topography and soil

##### Impacts

In normal operation, no impacts on geology or topography are expected.

With regards to potential operational impacts on soil quality, a regular impact relates to the infiltration of pesticides and herbicides in the soil if they are used during maintenance of green spaces. Other impacts would occur due to potential contaminants entering the soil during accidental spills from the following infrastructures:

- Mismanagement of discharges from the wastewater treatment plants (6 plants).
- Stagnant water in the unlined earthen central drain.
- Disturbance in runoff management from waste storage areas causing erosion.
- Poor management of washing water following a product spill on the road, after a truck/vehicle accident for example.

In case of spillage, the main issues will be about the groundwater and surface water contamination through soil infiltration or runoff. See previous section (§ 7.5.1.3) for impacts description.

All accidental (or not) discharges from the future industries cannot be defined yet as their process are unknown. Each of these industries will have to assess the impacts resulting from their discharges in a dedicated ESIA.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

##### Measures

The measures to be implemented are:

- **Obligation to fulfil a dedicated ESIA for each industry** establishing in the area. Impacts and measures related to discharges shall be studied and assessed appropriately. The defined measures will be added to the contractual specifications document for the future industrial.
- Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector;
- **Use of pesticides shall be prohibited.** Mechanical method for green spaces maintenance shall be privileged.

For the measures related to soil contamination, those defined in case of spillage in the above section (§ 7.5.1.3) applied for the soil.

#### 7.5.1.5. Impacts on landscape

##### Impacts

The GDIZ area will be designed to fit into the patterns of the landscape, and provide visual mitigation measures, where appropriate. For example, the buildings located close to the main external roads can be architecturally designed. Nevertheless, the scale and nature of the Project is such that it is not possible to

mitigate its visual impact entirely. An industrial area is a new feature in the area currently mainly occupied by agricultural land, and without mitigation, it will have some impact on the visual character and amenity of the area.

The location of the Project is a flat area despite the presence of several local variations. The spatial scope includes no viewpoints looking towards the GDIZ area. There are also no touristic sites in the vicinity of the project area.

Owing to the vision of an environmentally sustainable industrial area, the choice has been taken to create large open space and green areas as an important land use component. All plot will be provided with a community level green space. These green zones provide an opportunity to integrate nature with the industrial / commercial / residential area and to make provisions for spaces. All these green areas are accessible within walkable distances. The central spine road is provided with green buffer zones along the corridor. The residential areas are separated through these buffer zones of green belt.

Figure 105 above illustrates the open space system projected.

The entire GDIZ will be planted with native large canopy trees lining the wide roads and providing shade. The green pockets will be planted with native flowering plants and ornamental trees in the landscaped user zones.

Moreover, while designing, special consideration has been given to increase the frontage of the site to the public realm. As industrial land use is a secluded activity, maximum frontage for the site with interactive zones has been planned to increase public interaction and limit the visual disturbance linked to large warehouses and logistic areas. The blue dotted circles in the figure below illustrate land occupation / activities located along the outer road.

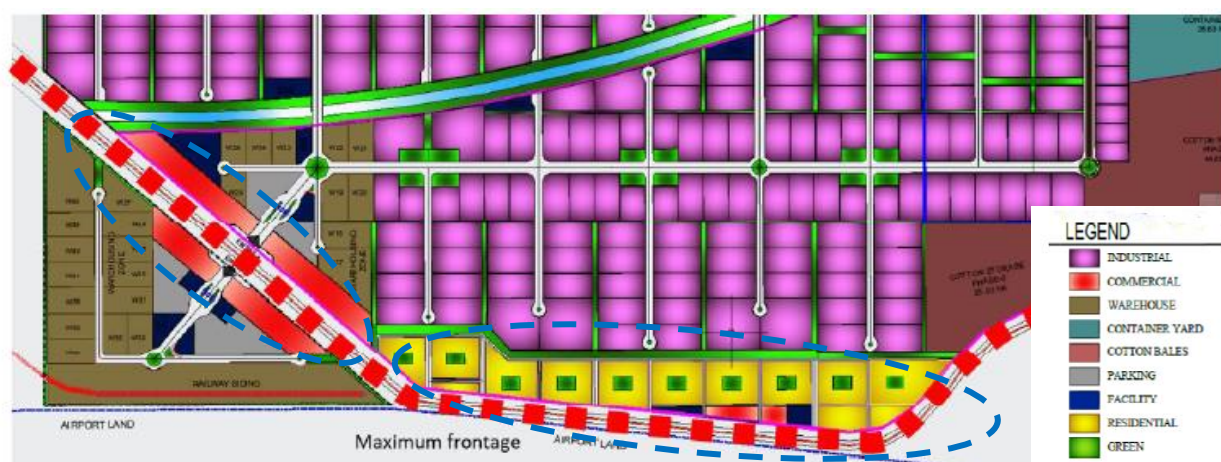


Figure 107 Interaction with the public

The large change in land uses and landscape lead in significant impact however limited by the natural screening from vegetation.

Another impact can affect the area, caused by the buildings and roads lighting at night. Indeed, large lighting during the night will be observed in places initially lightly lighted and even totally black during the night.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE

	MAJOR	MAJOR	MAJOR
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### Measures

Environmental, urban and landscaped integration lie at the centre of the Project with the proposition to develop around 150 ha of green spaces with indigenous plants and trees and the use and activity disposition limiting the direct visual on industrial and logistic areas from the main roads. Trees and shrubs will be chosen in keeping with prevailing weather conditions and other such site characteristics (see section 7.4.2.2). The maintenance of the green spaces will be primordial to limit the visual impact. Following measures are expected to be implemented:

- **Open green spaces maintenance operations** will begin after planting. Planting beds will be kept free of weed, grass and other undesired vegetation growth. In general, maintenance of all spaces under the GDIZ responsibilities has to be managed appropriately.
- Any **lighting requirements** should be designed to ensure light spill is directed into the site. Lighting at night shall be maintained at a minimum.
- The proper application of the waste management plan will ensure the maintain of the landscape conditions.

The residual impact will be considered minor.

#### **7.5.1.6. Focus on solid waste**

### Impacts

Every industry generates solid waste on a day to day basis. The waste should normally be stored at the source of waste generation until it is collected for disposal. As details on industry process are not known to date, the precise waste categories cannot be determined.

Nevertheless, standards and norms of waste generation have been applied to estimate waste generation (processing as well as non-processing) and the selected hypothesis are the following:

- **Non-hazardous waste:** 50 – 120 kg/day/ha of plot area calculated based on ARISE's working on SEZ development of similar industries.
- **Industrial hazardous waste:** 0.5 - 15 kg/day/ha of plot area based on ARISE's experience of design and environmental assessment of industrial land usage.

The total solid waste generation in GDIZ is estimated at 53,670 Kg per day (53.67 Tons per day) with 45% of Bio-degradable waste (organic in nature), 40% of non-biodegradable and 15% of inert waste.

The quantification is estimated as follow:

**Table 46 Solid waste quantification in GDIZ**

Particulars	Solid Waste Generated		Biodegradable Waste (45%)		Recyclable Waste (40%)		Inert Waste (15%)	
	kg/day	T/day	kg/day	T/day	kg/day	T/day	kg/day	T/day
Industrial	41527.30	41.53	18687	18.69	14535	14.53	6229	6.23
Commercial	2073.95	2.07	933	0.93	830	0.83	311	0.31
Warehouse & Logistics Facility	607.83	0.61	274	0.27	243	0.24	91	0.09
Cotton Storage	135.25	0.14	61	0.06	54	0.05	20	0.02
Container Yard	358.03	0.36	161	0.16	143	0.14	54	0.05
Residential	128.20	0.13	58	0.06	51	0.05	19	0.02
Green & Open	3286.99	3.29	1479	1.48	1315	1.31	493	0.49
Total Waste Generation	5552.59	5.55	2499	2.50	2221	2.22	833	0.83
	<b>53670.14</b>	<b>53.67</b>	<b>24151.56</b>	<b>24.15</b>	<b>19391.69</b>	<b>19.39</b>	<b>8050.52</b>	<b>8.05</b>

(Source: Preliminary detailed Project report for Glo-Djigbe industrial zone (GDIZ), Benin, May 2020)

The biodegradable waste will primarily consist in solid waste generated from residential and commercial kitchens, agro-industries, green sweepings, leaf litter, etc. The non-biodegradable waste will primarily consist in recyclable waste fraction consisting of fiber scrap, paper, cardboard, and packaging, plastic, polythene, tin, glass and metal waste and a fraction of inert waste.

The quantity of hazardous waste generated by industries will depend on the industry types and their operational practices. The expected hazardous waste in the proposed development includes spent oil, residues containing oil, spent carbon, catalyst, process residues, spent etching chemicals and solvents, discarded containers, barrels used for hazardous wastes, chemicals, and sludge generated from effluent treatment plants, etc.

Another source of waste will come from street sweepings with natural wastes, road traffic wastes, behavioural waste and silt from open drainage that will be collected. At the beginning, hand carts are recommended for collection of streets sweeping waste separately for processing as well as non-processing areas. Later, mechanized street cleaning can be adopted when GDIZ will be more developed.

The storage and transport of wastes during GDIZ operation, if inappropriately managed, has a number of potential negative impacts through releases to air, soil and water. Impacts which could occur include:

- Insufficient disposal frequencies or inappropriate storage containers could result in odour concerns.
- Container used for hazardous substances and or fuels/oils not correctly disposed could contaminate both streams and groundwater (and indirectly lead to human health issues).
- Incorrect handling, separation and storage of operation waste resulting in soil and water contamination impacts.
- Runoff from waste storage areas that is not collected and has the potential to contaminate soil, stormwater, and groundwater.
- Mismanagement of sludge from the treatment plants.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

## Measures

GDIZ plans that all waste being collected through primary collection system from industrial area will be taken care from processing until disposal site. The waste collected from the sources of generation is stored at a temporarily place termed as “Transfer Stations” and then transported in bulk to the processing or disposal sites. Seven transfer stations with an area of 200 m<sup>2</sup> are projected. The figure in § 4.3.1.3 illustrates the location of the transfer stations.

At the transfer station, waste will be further segregated, recyclable waste will be sold to the authorized vendors; biodegradable waste will be sent to the composting trench while nonbiodegradable and non-recyclable waste will be directly sent to the landfill site facility.

The landfill selection is under Government responsibility. In case where a new landfill must be developed, **a dedicated ESIA must be conducted.**

The composting trenches are distributed in 2 different locations. These locations are confined to the utility and green areas. The total area required for these trenches, including a 1.5-meter buffer is around 700 m<sup>2</sup>. The compost can be used for usage in horticulture in green corridors and parks and in agriculture area (where most raw materials are taken) for manures.

Clear **waste management procedures** have to be clearly established, implemented and communicated, both for the promoter and its workers, GDIZ, and the future industrial:

- Contractual specifications for future industrial: contractual obligations for the primary collection of waste.
- Waste management plan for waste collected from industries until disposal sites for GDIZ management;
- Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector, especially the one for Water management facilities.

Measures related to wastewater treatment plants’ sludge must be studied through a specific analysis due to specific issues linked to its management mode. Hence, **a dedicated ESIA for the wastewater treatment plants (6 plants)** shall be conducted in order to study and assess appropriately issues related to discharges and sludges management. The defined measures will be added in the waste management plan. **Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector, especially the one for Water and sanitation.**

The residual impact will be considered minor if the waste is appropriately managed at the site.

## 7.5.2. Impacts and measures on natural environment

### 7.5.2.1. Impacts

In operation phase, direct impacts on natural environment are not really expected due to the entire removal of habitat during the construction phase.



All small fauna that has been disturbed and moved during the works could come back on site and colonize the green spaces of the GDIZ. Normally, GDIZ is supposed to have solid perimeter wall but an open concept is planned which remain to be validated by the Benin authority in due course (not yet accepted). For small animal, some gaps between the ground and the bottom of the wall are therefore anticipated and could facilitate small animal crossing.

Hence, species as *Tragelaphus scriptus* Harnessed bushbuck, *Philantomba walteri* Duiker, *Genetta tigrine* Cape genet and *Chlorocebus aethiops tantalus* Tantalus monkey could be observed on site, especially during night-time when disturbance (traffic, noise, etc.) are weak. Same for birds, they will be able to nest again, on ground or in the trees of the new green spaces.

Regarding the forest area, beyond its sacred character for the villagers, its ecologic value has largely decreased over the last years because of the frequentation of the forest by men and the increase of surroundings crops. Both elements have deleted most of the animal displacement corridors and gene flows, reducing faunistic diversity. With the GDIZ, the forest area will be surrounded by parking and logistics areas limiting even more fauna movements from and to the forest. To this end, including the forest in the master plan of the Project area will not have as its main objective the conservation of wildlife but rather the sacred nature of the forest. But like for the GDIZ perimeter wall, to maintain some gaps between the ground and the bottom of the forest wall/fence would enable movements for little fauna (as cape genet, lagomorph species, etc).

By contrast, this free circulation of the fauna could lead to several problems and indirect impacts in case of poor waste management. Because organic waste attracts animals, the waste storage will provide attractive habitat for little fauna and birds but also to rats and other vermin. In case all waste is mixed up, animals might be injured or might death if they accidentally ingest plastic or hazardous waste. Health and safety issues might be observed with the presence of pests. Traffic might be also cause injuries or death to animals due to accidental collision. But as fauna is likely to move during the night-time, where traffic is almost non-existent, impact is judged negligible.

Another indirect impact on natural environment could be observed downstream the GDIZ in case of mismanagement of wastewater / stormwater in the central drain (see section 7.5.1.3). As a reminder, the central depression will gather:

- All treated effluent from the wastewater treatment plants;
- All superficial runoff from rain and road washing (after an accidental event for example);
- Other unauthorized discharges (accidental or not) from industrial plants can lead in pollution issues. But as these industrials area not yet known, these potentials discharges and related pollution issues cannot be assessed.

As described below (see section 7.5.1.3), stagnation of contaminated water in the central drain, uncontrolled discharged of contaminated water in the central drain or in other place, increase of runoff volume at the level of the longitudinal depression passing through the GDIZ could lead in flooding and pollution of the habitats and environment located in the depression south of GDIZ and connected to the Lama river (due to natural hydrologic patterns). As these habitats are quite similar to those initially onsite, largely anthropized with low ecologic values, impact is minor.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### 7.5.2.2. Measures

- **Set up of green hedges** for GDIZ and sacred forest perimeter instead of protection grating or any other material that could prevent small animals to pass. If not possible, plan some gaps between the ground and the bottom of the wall. Note that green hedges will be better for the GDIZ landscaping integration than a wall.
- **Ensure an effectiveness waste selective sorting**, and an appropriate storage of organic waste in the compost trenches. These, as well as the waste transfer centers, must be well fenced in order to prevent animals to pass.
- Measures defined for the management of the central drain in section 7.5.1.3 are also applicable to avoid or reduce impacts on the natural environment.

The residual impact will be considered negligible

### 7.5.3. Impacts on the human environment and mitigation measures

#### 7.5.3.1. Impacts on land tenure and land use

##### Impacts

In operation phase, the only potential impacts that will be generated by the Project on land tenure and land uses is caused by the operation of the site central drain.

As underlined in 7.5.1.3.3, in rainy season, the central drain will discharge its excess water in the natural environment downstream of the discharge point. The precise affected area, its surface and the possible water depth are not known at this stage because the technical studies are not available yet.

As seen on the picture below, the environment at discharge point is currently fully cultivated, punctuated by scattered housing and not far from Dokanme and Zebe villages.



Figure 108 : Location of the central drain discharge point and downstream environment

Water, whose quality will normally be guaranteed thanks to a treatment on site targeting certain standards (§ 7.5.1.3.1), will inundate the crops and houses and stagnate in the area creating an unhealthy environment with a proliferation of mosquitoes increasing malaria prevalence among villagers. If not properly treated on the site, water quality will be poor and could contain suspended particles, various pollutants and pathogenic bacteria.

The impact is therefore major given its uncertainty and potentially affected surfaces.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### Measures

The measures proposed in the § 7.5.1.3.3 should be enough to prevent this impact from occurring. Nevertheless, should the impact materialize, the following measures should be deployed:

- ensure the Government will provide with a solution so that GDIZ waters are discharged up to the Lama river;

- compensate land owners, farmers and building owners for the damages caused to their assets by the flooding;
- find a permanent solution to prevent flooding from occurring again (in the absence of action by the Government).

The residual impact will stay moderate due to uncertainties on its occurrence, frequency and surface area affected.

### 7.5.3.2. Impacts on economic activities, livelihoods and local economy (employment)

#### Impacts

The operation of GDIZ will generate around 12,000 direct jobs according to estimates made by the promoter. These jobs will be created by GDIZ, which will manage the industrial estate, and by all the operators who will operate on the site.

The recruitment of labor will have the positive effect of helping to permanently reduce unemployment in the Tori-Bossito and Ze municipalities and to launch a dynamic economic growth.

Nevertheless, the jobs created will mainly be semi-skilled to skilled positions with fewer unskilled positions to be filled than during the construction phase. As underlined in § 7.4.3.1, the individuals living in the Project area may not have the skills required to fill these positions.

It is therefore highly likely that many employment opportunities may not benefit them, which could create dissatisfaction and opposition to the Project, with risks of vandalism and damage to Project facilities.

Although the impact is positive, measures to maximize its effects are required.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
Negative	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

#### Measures

The measures to be implemented are:

- set up a recruitment program for local labor of GDIZ as a matter of priority, particularly those affected by the Project (PAPs) with equal skills;
- include clauses on the local recruitment program in the GDIZ operating guidelines;
- monitor industrial operators' compliance with the GDIZ operating Guidelines;
- put in place the Stakeholder Engagement Plan (SEP) and the complaints management mechanism.

### 7.5.3.3. Impacts on women and vulnerable groups

#### Impacts

As seen during the construction phase (cf. § 7.4.3.4 and 7.4.3.5), women and vulnerable groups might not benefit from the 12,000 job opportunities offered by the Project. They could also suffer from work place discrimination.

The impact is moderate.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### Measures

Following measures are proposed:

- respect beninese national legal framework and international standards concerning gender equality and the fight against gendered-based violence as well as international standards (ILO conventions) concerning PWDs and the prohibition of child labor;
- establish positive discriminatory measures that will promote the employment of women and vulnerable persons by GDIZ (involving the Centers for Social Promotion) beyond jobs usually attributed to them;
- include clauses requiring positive discriminatory measures and non-discrimination of women and vulnerable persons in the GDIZ operating guidelines targeting GDIZ operators;
- monitor industrial operators' compliance with the GDIZ operating guidelines;
- conduct regular controls to ensure no children under 14 are employed on the site;
- facilitate women and PWDs integration on the GDIZ site by setting up infrastructures dedicated to them (toilets, bathrooms, access ramps, elevators, etc.);
- raise workers' awareness on gender equality, discrimination and violence against women or vulnerable persons;
- condemn any form of gender-based violence or discrimination against vulnerable persons by GDIZ workers in the Code of Conduct and internal rules and plan disciplinary measures for offenders;
- plan for a grievance mechanism adapted to the reception and treatment of gender-based violence.

The residual will become minor.

### 7.5.3.4. Impacts on health and safety of workers

#### Impacts

In the operational phase, workers will be employed directly by GDIZ or by the industries settled on site. Impacts on the health and safety of workers can take different forms:

- employees and customers may be exposed to sources of noise emissions such as technical equipment and transport machinery;
- operation activities may require the handling and use of hazardous products (used oil) and the production of waste. Poisoning or burns to the skin or eyes when handling these products may result if no precautions are taken;



- maintenance and repair activities requiring to work on machinery might cause pinches or sectioning of limbs;
- dust and atmospheric emissions emitted by technical equipment and transport machinery can affect the health of workers;
- storage and handling of hazardous products, in particular hydrocarbons, causes risk of spills, fire, explosion and injury. Poisoning or burns to the skin or eyes when handling dangerous products such as solvents, hydrocarbons and other chemicals may result;
- heavy traffic on major roads (RNIE 2);
- traumatic accidents caused by unsafe working conditions (joint trauma due to the transport of heavy loads or manual work, etc.);
- illegal intrusion of individuals on the site;
- exposure of workers to STDs and HIV/Aids if they associate with sex workers outside the site.

Worker's rights might also not be respected by industrial operators.

A dispensary on the site, as well as a police and fire station, will make it possible to contain these various risks to the health and safety of individuals. The impact is therefore moderate.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### **Measures**

The measures to be implemented are:

- include clauses on Occupational hygiene, health and safety of workers in the GDIZ operating guidelines;
- monitor industrial operators' compliance with the GDIZ operating guidelines;
- make PPE available for workers and ensure their effective wearing;
- set up and implement an Occupational Hygiene, Health and Safety Plan;
- set up and implement a Waste Management Plan;
- set up and implement a Traffic and Road Safety Plan;
- recruit an HSE coordinator in charge of monitoring the correct application of the plans;
- manage the workforce and ensure working conditions in accordance with Benin's national regulations and the ILO conventions ratified by Benin.

After the implementation of corrective measures, the level of residual risk will be minor.

### **7.5.3.5. Impacts on health and safety of community**

#### **Impacts**

In operation phase, the site will be fenced, and entrance of visitors and employees will be monitored at the entrance gate. There should be limited interactions between inhabitants from the surrounding villages and the site activities.

However, local communities are exposed to 2 risks:

- Technological accidents due to default risks on site.
- Increased road traffic and accidents on RNIE 2.

So far, the RNIE 2 in front of the site entrance has an average daily traffic of 16,663 vehicles with a majority of 2-wheels (54%) and 4-wheels (39%) vehicles. During Project operation, estimates of traffic show that there should be around 15,000 vehicles a day transiting in and out from GDIZ. The Project will therefore double the traffic on RNIE 2.

The impact is moderate because currently, RNIE 2 is in good condition and wide enough to sustain the traffic and in operation, all necessary protections will be deployed at the site entrance to ensure safety for residents. Besides, GDIZ plans to have a fire station and police station along with a dispensary, which will allow for a rapid care in case of emergency situation.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

### Measures

The following measures must be developed:

- develop an emergency plan in case of accidental spillage or other kind of accident on site;
- realize hazard assessment studies for future industries whose process requires it (involving storage silos or process with combustible or explosives);
- continue awareness-raising campaign on road safety in the 8 villages surrounding the Project site;

The residual impact will be minor.

### 7.5.3.6. Impacts on air quality and noise

#### Impacts

The impacts on air quality and noise in operation phase will mostly be generated by the various industries settled in GDIZ and come from the operation of the machinery and industrial equipment present at each industrial unit. Road traffic will also be an important source of noise given the traffic predicted on site (cf. previous section).

The impact remains minor.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

## Measures

The measures proposed are:

- include clauses on air quality and noise in the GDIZ operating guidelines;
- monitor industrial operators' compliance with the GDIZ operating Guidelines;
- avoid noisy work during off-duty hours;
- limit the vehicles speed in inhabited area (30 km/h);
- use good quality vehicles, preferably new, with engines in good condition;
- work with equipment that meets the required standards in terms of noise emissions.

The residual impact will be considered negligible.

### 7.5.3.7. Impacts on water resources

## Impacts

The operation of GDIZ will require to pump important volumes from the water table (volumes indicated in § 4.8) to feed GDIZ common infrastructures and its industries. GDIZ will drill around 200 wells from 30 to 150 meters depth.

Local communities from the 8 villages surrounding the Project site also rely on the water table for their daily water need. They use various hydraulic infrastructures to extract water (§ 6.5.7.3). They already encounter trouble to access water, due to a lack of water infrastructures and to low flows.

Although the area is probably well gifted in abundant water resources due to the general hydrological conditions in southern Benin, there is a major risk that the water needs of site compete with communities' needs and undermine the community's capacity to satisfy their daily needs. Indeed, water extraction for the site might lead to a decrease in water reserves in the aquifer which, if it is used by local communities' hydraulic equipment, will lead to a decrease or a stop of the flow in these equipments.

The likelihood of this impact cannot be assessed at this stage due to a lack of technical hydrogeological studies.

The impact is rated as moderate.

Nature of the impact	Effect of the impact	Sensitivity level of the component	Level of impact intensity	Importance of the impact
POSITIVE	DIRECT	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE
NEGATIVE	INDIRECT	MINOR	MINOR	MINOR
		MODERATE	MODERATE	MODERATE
		MAJOR	MAJOR	MAJOR

## Measures

The measures prescribed in the § 7.5.1.3 must be implemented to better assess and address this impact. It will also be required to regularly assess the efficiency of the various hydraulic systems in the 8 villages of the study area through interviews with the head of villages.

The residual impact will remain moderate and as a **compensation**, it will be necessary to build additional village hydraulic systems should the water flow reduce or stop on existing ones.

#### 7.5.4. Impacts and measures synthesis for the operation phase

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
Climate, air quality and noise	Atmospheric emissions	-Smoke and greenhouse gas emissions from substations and emergency generators -Large part of the vehicle fleet is not under GDIZ responsibility		-Routine maintenance checks -Careful closed-loop handling and full SF6 recycling upon equipment retirement -Application of the decree n°2001-110 of 4 April 2001	
	Atmospheric emissions from industrial units	Specific emissions from the future industrial unit		Assess the impacts resulting from their discharges in a dedicated ESIA Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector	
	Noise from traffic and industrial process	Future industrial unit can cause noise emissions.		-Assess the impacts resulting from their noise emission in a dedicated ESIA -Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector	
		Main source of noise will come from traffic.		Speed limit in line with the road's classification	
		GDIZ common utilities are not expected to create noise emissions, except electrical substations which are located far away from residential area		Acoustically isolate the electrical substation	
Hydrology and hydrogeology	Discharges (degraded mode or not)	Stormwater from area that can be lixiviated, producing contaminated water.		-Stormwater from areas with oily process operations will be drained through oil interceptors before being discharged -Each outfall location must be equipped with grates or nets to arrest the debris	

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
		It is expected that 10,336.89 m <sup>3</sup> of treated effluent will be discharged in the central drain per day. Initial effluents will have various quality level depending on their source (industrial or domestic).		-Implementation of preliminary treatment at industrial plot level -Monitoring of all liquids effluents discharges in the environment	
				-Monitoring of all liquids effluents discharges in the environment	
		-Discharges in dried drain without possibility of dilution for the treated effluents. -High risk of standing water implying nuisances (odour), potential pollution and development of disease vectors		-Definition, for all industrial units, of effluent requirements to be accepted in the CETP -Obligation to fulfil a dedicated ESIA for the treatment plants -Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector, especially the one for Water and sanitation -Obtain an operating permit for wastewater discharges	
		Accidental events could lead to an accidental spillage of hazardous products or a release of untreated wastewater		Development of an emergency plan in case of accidental spillage	
	Water supply	-Need of 18,000 m <sup>3</sup> per day (industrial, commercial and residential uses) -Aquifer capacity and potential concurrency with the other uses are unknown		Develop a hydrogeological study including an exploitation modelling on the resources	
		Drilling of boreholes to feed the supply network		-Obtain an operating permit for groundwater withdrawal and drilling -Perform dedicated EIA for drilling under Beninese regulation -Assess and managed drilling activities	



Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
		Need for GDIZ around 18,000 m3 per day		Water consumption monitoring for the entire GDIZ	
	Hydraulic scheme	GDIZ will not disturb the natural hydraulic scheme of the area. But large soil sealing will increase superficial runoff and the water volume in the central depression that can causes flooding downstream		-Conduct hydraulic study -Develop and implement design concept to reduce runoff volume. -Discuss with the government for the overall stormwater management of the area	
Habitat, fauna and flora	GDIZ easement	-Presence of GDIZ will limit animal movements, including in the sacred foret -Ecologic value of these place has largely decrease the last years because of the frequentation of the forest by men and the increase of surroundings crops that have delete mostly of the displacement corridors and gene flow reducing faunistic diversity		Implementation of green hedges for GDIZ and sacred forest perimeter, or if a wall, plan some gaps between the ground and the bottom of the wall	
	Waste production	-Injuries and death of animals that are attracted by organic waste -Development of pests attracted by accessible organic waste		Ensure an effectiveness selective sorting & fence the composting trenches and the waste transfer centers	
	Effluents discharges (degraded mode or not)	Flooding and contamination of habitats downstream the area in case of disturbance in the management of several infrastructures / activities (runoff from waste storage, stagnant water in the central drain, discharges from the wastewater treatment plants or industrial unit)		See above measures regarding water quality	

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
Geology, topography and soil	Effluents discharges (degraded mode) & waste production	Impacts on soil quality in case of disturbance in the management of several infrastructures / activities (runoff from waste storage, stagnant water in the central drain, discharges from the wastewater treatment plants)		See above measures regarding water quality	
	Discharges from industrial units	Specific discharges from the future industrial unit		-Assess the impacts resulting from their discharges in a dedicated ESIA -Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector	
	Maintain of green spaces	Environmental degradation in case of use of chemical products		Use of pesticides shall be prohibited. Mechanical method for green spaces maintenance shall be privileged	
Landscape	Easement of GDIZ	-Large change in land uses and landscape lead in significant visual impact however limited by the natural screening from vegetation and in the absence of touristic area -The Project aims to develop around 150 ha of green spaces with indigenous plants and trees.		Open green spaces maintenance operations	
		Large lighting during the night will be observed in places initially lightly lighted		Appropriate light management at night time	
All above items	Waste production	Production of 53.67 Tons per day with 45% of Bio-degradable waste (organic in nature), 40% of non-biodegradable and 15% of inert waste Possible impacts if inappropriately managed		Contractual specifications for future industrial: contractual obligations for the primary collection of waste	
		Selection of landfill under Govt. Responsibility		-Assess the impacts resulting from this new landfill in a dedicated ESIA -Obtain an operating permit for waste disposal in a landfill	

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
		Specific waste to be managed, including those from the wastewater treatment plant		<ul style="list-style-type: none"> <li>-Waste management plan for waste collected from industries until disposal sites for GDIZ</li> <li>-Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector, especially the one for waste management facilities</li> <li>-Sludge from wastewater treatment plants: measures to be defined through making a dedicated ESIA and to be included in the waste management plan</li> <li>-Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector, especially the one for Water and sanitation</li> </ul>	
Land tenure and land use	Liquid discharges production	Discharge of excess water from the central drain into the natural environment causing inundations to the crops and houses and water stagnation in the area creating an unhealthy environment with a proliferation of mosquitoes increasing malaria prevalence among villagers		<ul style="list-style-type: none"> <li>-Ensure the Government will provide with a solution so that GDIZ waters are discharged up to the Lama depression</li> <li>-Compensate land owners, farmers and building owners for the damages caused to their assets by the flooding</li> <li>-Find a permanent solution to prevent flooding from occurring again (in the absence of action by the Government)</li> </ul>	
Economic activities, livelihoods and local economy (employment)	Employment	Creation of around 12,000 jobs on GDIZ		<ul style="list-style-type: none"> <li>-Set up a recruitment program for local labor for GDIZ operations as a matter of priority, particularly those affected by the Project (PAPs) with equal skills;</li> <li>-Include clauses on the local recruitment program in the GDIZ operating guidelines</li> <li>-Monitor industrial operators' compliance with the GDIZ operating Guidelines</li> <li>-Put in place the Stakeholder Engagement Plan (SEP) and the complaints management mechanism</li> </ul>	

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
Women and gender issues	Employment	-Limited access to the job opportunities created by the Project -Risks of degrading treatment in terms of harassment, verbal and physical violence -Exploitation of children under the age of 14		-Include clauses on positive discriminatory measures and non-discrimination of women and vulnerable persons in the GDIZ operating guidelines -Monitor industrial operators' compliance with the GDIZ operating Guidelines -Respect beninese national legal framework and international standards concerning gender equality and the fight against violence made to women as well as and international standards (ILO conventions) concerning PWDs and the prohibition of child labor -Conduct regular controls to ensure no children under 14 are employed on the site -Establish positive discriminatory measures that will promote the employment of women and vulnerable persons (involving the involve the Centers for Social Promotion) beyond jobs usually attributed to them -Facilitate their integration on the GDIZ site by setting up infrastructures dedicated to them -Raise workers' awareness on gender equality, discrimination and violence against women and the risks of STDs and HIV/AIDS -Condemn any form of gender-based violence or discrimination against vulnerable persons by GDIZ workers in the Code of -Conduct and plan disciplinary measures for offenders -Implement a grievance mechanism adapted to the reception and treatment of gender-based violence	
Vulnerable groups					

Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
Health and safety (workers)	Traffic Atmospheric emissions Solid waste production Liquid discharge production	Exposure of workers to accidents and diseases caused by various factors		<ul style="list-style-type: none"> <li>-Include clauses on Occupation hygiene, health and safety of workers in the GDIZ operating guidelines</li> <li>-Monitor industrial operators' compliance with the GDIZ operating Guidelines</li> <li>-Make PPE available for workers and ensure their effective wearing</li> <li>-Set up and implement a Waste Management Plan;</li> <li>-Set up and implement a Traffic and Road Safety Plan;</li> <li>-Set up and implement an Occupational Hygiene, Health and Safety Plan;</li> <li>-Recruit an HSE coordinator in charge of monitoring the correct application of the plans;</li> <li>-Manage the workforce and ensure working conditions in accordance with Benin's national regulations and the ILO conventions ratified by Benin</li> </ul>	
Health and safety (community)	Traffic Atmospheric emissions Solid waste production Liquid discharge production	Exposure of local community members to accidents and diseases caused by various factors		<ul style="list-style-type: none"> <li>-Develop an emergency plan in case of accidental spillage or other kind of accident on site</li> <li>-Continue awareness-raising on road safety in the 8 villages surrounding the Project site</li> <li>-Realize environmental impact assessment (EIA) for future industries whose process requires it</li> <li>-Realize hazard assessment studies for future industries whose process requires it (involving storage silos or process with combustible or explosives)</li> </ul>	



Environmental item	Impact factor	Description of the potential impact	Impact potential	Mitigation measure	Residual impact
Air quality and noise	Traffic Atmospheric emissions	Nuisances caused by air emissions and noise affecting the populations living in the vicinity of the construction site, particularly those in the villages of Agbodjedo, Djitin-Aga and Anavie, which are the closest to GDIZ boundaries		<ul style="list-style-type: none"> <li>-Include clauses on air quality and noise in the GDIZ operating guidelines</li> <li>-Monitor industrial operators' compliance with the GDIZ operating Guidelines</li> <li>-Avoid noisy work during off-duty hours</li> <li>-Limit the speed of trucks to 30 km/h in all populated areas</li> <li>-Use good quality vehicles, preferably new, with engines in good condition</li> <li>-Work with equipment that meets the required standards in terms of noise emissions</li> </ul>	
Water resources	Resources consumption (energy, water)	Reduction of water resources available for the local communities		<ul style="list-style-type: none"> <li>-Regularly assess the efficiency of the various hydraulic systems in the 8 villages of the study area through interviews with the head of villages.</li> </ul> <p><b><u>Compensation:</u></b></p> <ul style="list-style-type: none"> <li>-Build additional village hydraulic systems should the water flow reduce or stop on existing ones.</li> </ul>	

## 7.6. Residual impact matrix

After the implementation of the mitigation measures for the preparation, construction and operation phase, the residual impacts have been assessed and are presented in the table below.

Table 45 : Residual impacts matrix

		PREPARATION	CONSTRUCTION							EXPLOITATION							
	<div><div><div>No IMPACT</div><div>NEGLIGIBLEMODERATE</div><div>MINORMAJOR</div></div><div><div>Se</div><div>Imp</div><div>I</div><div>Se = sensitivity of the environment Imp = Importance = Se x I I= Intensity of the impact Negatif = 1 to 4 Positif= P</div></div></div>	Project land acquisition	Civil works, including access road & drilling	Traffic	Atmospheric emission	Solid waste production	Liquid discharges production	Employment	Resources consumption (energy, water)	Easement of GDIZ	Atmospheric emission	Solid waste production	Liquid discharges production	Resources consumption (energy, water)	Traffic	Employment	Accidental situation
Physical environment	Climate, air quality and noise																
	Hydrology and hydrogeology																
	Geology, topography and soils																
	Landscape																
Biological environment	Protected Areas																
	Habitat and flora																
	Fauna																
	Ecosystem services																
Human Environment	Demographic balance and migrations																
	Women and gender issues																
	Vulnerable groups																
	Land tenure and land use																
	Economic activities, livelihoods and local economy (employment)																
	Habitat and settlements																
	Health and Safety																
	Cultural Heritage																

## 7.7. Impacts on the ecosystem services

### 7.7.1. Services identification and consultation process

In the study area, several services are provided by natural ecosystems. These services have been identified thanks to field survey activities conducted in November/December 2019 and August/September 2020. During field surveys, social specialists used various tools (cf. 6.1.3) to perform services identification.

The services identified are presented in the previous sections (cf. § 6.5.6.2).

Because the Project is likely to have negative impacts on some of these services, a systematic examination has been realised in order to identify which ones are high priority according to IFC performance standard n°6 and to propose adequate mitigation measures.

### 7.7.2. Different types of ecosystem services

Ecosystem services are categorized as 2 types<sup>13</sup>:

- **Type I: Provisioning, regulating, cultural and supporting ecosystem services**, over which the client has direct management control or significant influence, and where impacts on such services may adversely affect communities. Type I ecosystem services will be considered priority under the following circumstances:
  - Project operations are likely to result in a significant impact on the ecosystem service;
  - The impact will result in a direct adverse impact on Affected Communities “livelihood, health, safety, and/or cultural heritage,” and,
  - The project has direct management control or significant influence over the service.
- **Type II: Provisioning, regulating, cultural and supporting ecosystem services**, over which the client has direct management control or significant influence, and on which he depends directly for its operations. Type II ecosystem services will be considered priority under the following circumstance:
  - The project directly depends on the service for its primary operations; and
  - The project has direct management control or significant influence over the service.

### 7.7.3. Identification of priority ecosystem services

The table on the following pages present the results of the assessment of ecosystem services present in the study area and identify priority ones.

In the table, the column “Presence of the service” gives information on the effective presence of the service in the study area, while the column “Use of the service” details the concrete use made of the service.

For type I services, whenever columns “Impact of the project on the service”; “Consequences for the communities”; “Management or influence on the service by the project”; bear the mention YES, then the service is regarded as priority type I.

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<sup>13</sup> IFC-Guidance Note 6 p. 45 à 50

For type II services, whenever columns “Dependency of the project on the service” and “Management or influence on the service by the project” bear the mention YES, then the service is regarded as priority type II.



**Table 46 : Ecosystem services assesement (ESA)**

Type of service	Presence of the service	Use of the service	Impact of the project on the service	Consequences for the communities	Dependency of the project on the service	Management or influence on the service by the project	Priority of the service and type of priority
<b>PROVISIONING</b>							
Farmland	Yes	Almost 100% of the Project area is presently cultivated or in fallow.	Yes	Yes	No	Yes	Priority type 1
Pasture land	No	No	No	No	No	No	No
Halieutic resources	No	No	No	No	No	No	No
Sand and gravels	No	No	No	No	No	No	No
Aquaculture	No	No	No	No	No	No	No
Wild food: hunting and gathering	Yes	Villagers hunt small animals mostly for trade and collect wild medicinal plants.	Yes Loss of collection areas because of the Project footprint	Yes Impact limited because hunting is not practiced by all villagers and because of site anthropisation which already reduced game and plant availability	No	Yes	Priority type 1

Type of service	Presence of the service	Use of the service	Impact of the project on the service	Consequences for the communities	Dependency of the project on the service	Management or influence on the service by the project	Priority of the service and type of priority
Biochemical products, natural medicine and pharmaceutical products	Yes	Villagers and traditional healers collect wild plants for medicinal and ritual purposes	Yes Loss of collection areas because of the Project footprint	Yes Impact limited because plant gathering is not practiced by all villagers and because of site anthropisation which already reduced plant availability	No	Yes	Priority type 1
Wood and wood fibers (teak, eucalyptus, palm tree leaves, raffia)	Yes	Construction of houses (architecture) and roofs	Yes Loss of collection areas because of the Project footprint	Yes Impact limited because of site anthropisation which already reduced forest coverage to a minimum	No	Yes	Priority type 1
Other fibers	No	No	No	No	No	No	No
Fuel	Yes	Fire and charcoal to cook	Yes Loss of collection areas because of the Project footprint	Yes Impact limited because of site anthropisation which already reduced forest coverage to a minimum	No	Yes	Priority type 1
Fresh water	No	No	No	No	No	No	No

Type of service	Presence of the service	Use of the service	Impact of the project on the service	Consequences for the communities	Dependency of the project on the service	Management or influence on the service by the project	Priority of the service and type of priority
Genetic resources	No	No	No	No	No	No	No
<b>CULTURAL</b>							
Sacred sites	Yes	Sacred forest of Anavie used to perform Voodoo rituals Various individual sacred sites across the farmland installed by farmers to protect their crops	Yes Loss of sacred sites	Yes Important impact due to importance of Voodoo among local communities	No	Yes	Priority type 1
Religious areas	No	No	No	No	No	No	No
Recreational, tourism or leisure areas	No	No	No	No	No	No	No
<b>REGULATING</b>							
Regulation of air quality	No	No	No	No	No	No	No
Regulation of global climate	No	No	No	No	No	No	No
Regulation of regional/local climate							
Regulation of water	No	No	No	No	No	No	No
Regulation of erosion	No	No	No	No	No	No	No
Water purification and waste treatment	No	No	No	No	No	No	No
Disease regulation	No	No	No	No	No	No	No

Type of service	Presence of the service	Use of the service	Impact of the project on the service	Consequences for the communities	Dependency of the project on the service	Management or influence on the service by the project	Priority of the service and type of priority
Pest regulation	No	No	No	No	No	No	No
Pollination	No	No	No	No	No	No	No
Natural catastrophes regulation	Yes	Yes Indirect use. Large agricultural area favouring water infiltration in the soil	Yes Soil sealing reducing water infiltration	Yes Possible flooding downstream the GDIZ	No	Yes	Priority type 1
<b>SUPPORTING</b>							
Capture and recycling of nutrients	No	No	No	No	No	No	No
Primary production	No	No	No	No	No	No	No
Connexions for genetic exchanges	No	No	No	No	No	No	No

#### 7.7.4. Mitigation measures

The analysis reveals that there are in the study area several ecosystem services of priority 1 which are:

- **Provisioning services:** farmland, wild food: hunting and gathering, biochemical products, natural medicine and pharmaceutical products, wood and wood fibers (teak, eucalyptus, palm tree leaves, raffia), fuel.
- **Cultural services:** sacred sites.
- **Regulating services:** natural catastrophes regulation.

A set of measures already proposed in the section 7.3, 7.4 and 7.5 (physical, biological and human environments) help to avoid, reduce and compensate for the impacts on provisioning, cultural, and regulating ecosystem services. The measures planned for social aspects also respond to these challenges. No need for additional measures is identified in this section.

### 7.8. Cumulative impact assesement

#### 7.8.1. Justification for the analysis

Cumulative impacts are additive or interactive impacts inducing sudden or gradual changes in time and space on the biophysical or human environment. Consideration for the cumulative impacts of a project refers to the assessment of the potential for its whole or parts of impacts to aggravate or add to a particular phenomenon.

In the case of this report, the focus will be on assessing whether similar impacts between different existing or future projects present synergistic or antagonistic effects (non-linear effects) or whether they are simply additive.

If the effects are merely additive, then the measures implemented on a project-by-project basis are deemed to be necessary and sufficient.

However, if synergistic effects are suspected, such as a threshold effect, then the measures developed on a project-by-project basis may not be sufficient. Complementary measures are then proposed, to be implemented transversally by the various stakeholders.

#### 7.8.2. Methodology

The methodology used in this report is based on the IFC guidebook *Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets* (2013). It follows the main steps of the approach presented in this guide, namely:

1. Determine spatial and temporal boundaries of the analysis
2. Identify valued environmental and social components (CEVs)
3. Identify all the projects that might affect CEVs
4. Determine the baseline status of CEVs
5. Assess cumulative impacts and their importance for each CEVs
6. Develop and implement strategies, plans and procedures to manage cumulative impacts

#### 7.8.3. Spatial and temporal boundaries



Since GDIZ Project is set up in the broader framework of the Special Economic Zone of Glo-Djigbe and settled near the future International Airport of Glo-Djigbe, the analysis of the cumulative impacts stretches over these zones whose boundaries are visible in the map on the next page. It encompasses the municipalities of Abomey-Calavi, Allada, Tori-Bossito and Ze.

Temporal boundaries is set over a 5 year-period in order to encompass the construction of the airport and the development of the SEZ.

#### **7.8.4. Projects analysed**

Two major projects will be developed within the same timeframe as GDIZ:

- The Glo-Djigbe development area which encompasses GDIZ.
- The construction and operation of the International Airport of New Cotonou (Glo-Djigbe).

The exact date of development of these projects is not known, but so far, the airport project construction has started in 2018 but has been suspended; and the decree for expropriation on Glo-Djigbe area has been promulgated in January 2020 indicating that the project should start soon.

The map below shows the location of these projects as well as the roads that are planned to be built in connection with the airport (see § 4.2.3).

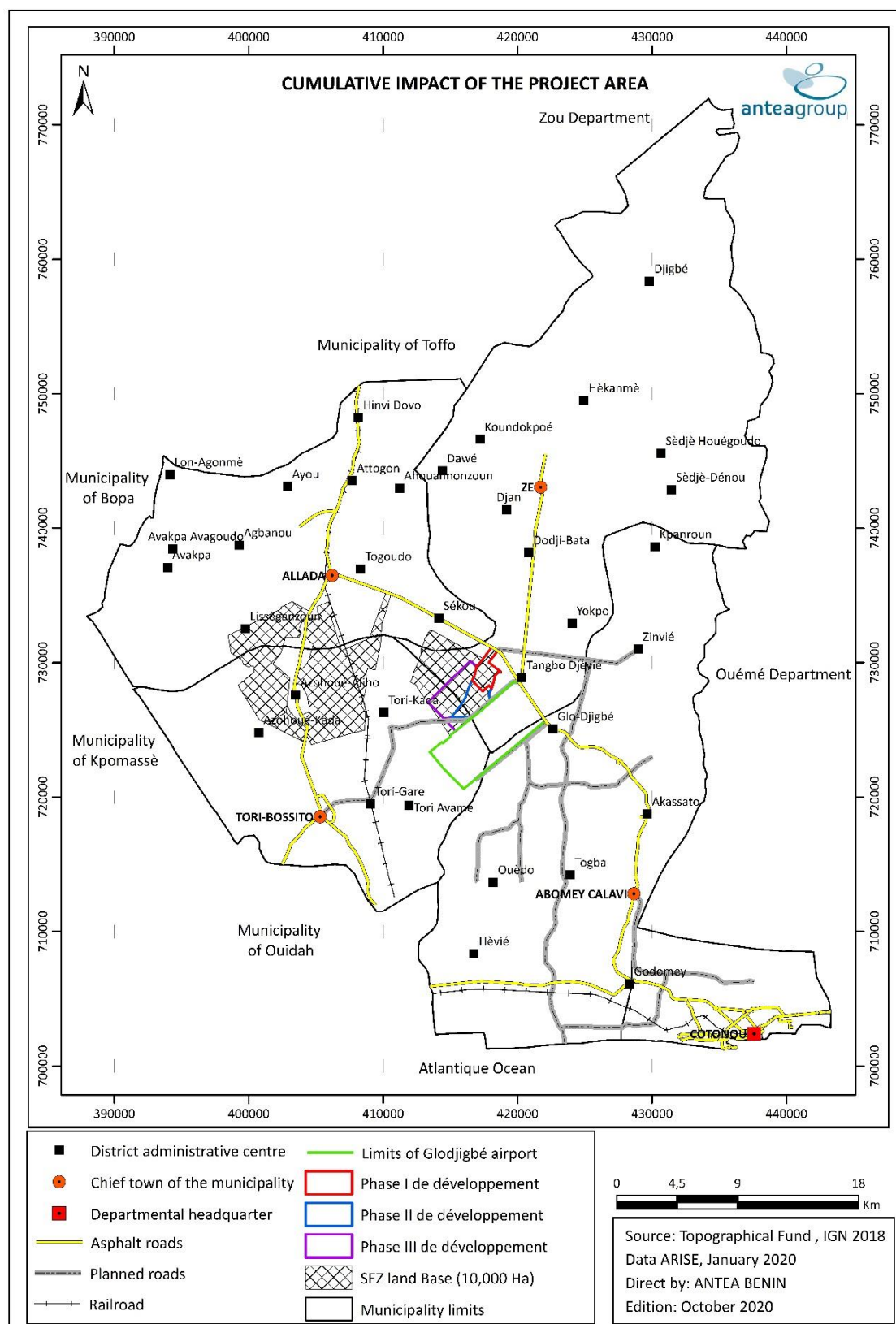


Figure 109 : Location of projects covered by the cumulative impact assessment

#### 7.8.4.1. New Cotonou (Glo-Djigbe) International Airport

The Government of the Republic of Benin has a Five-Year Plan of Action under which an investment program has been adopted. This program aims, among other objectives, at the construction of the New Cotonou (Glo-Djigbe) International Airport whose engineering has been granted to the French company Aeroport de Paris Ingenierie (ADP-I) and whose construction has to be planned by the Government. The main characteristics of the airport are:

- a track 4,250 m long and 60 m wide;
- a 150 m x 100 m safety area and a holding area at each end of the runway;
- rapid exit lanes and connecting ramps;
- parking areas;
- a passenger terminal building to handle over 900 passengers per peak hour for both arrival and departure;
- a cargo terminal capable of handling 12,000 tons per year;
- a 40 km expressway linking the (Fishing Road) to the airport hub with a crossing of the RNIE 1 at Cocotomey.



(Source: ADP-Ingenierie)

**Figure 110 : Design image of Glo-Djigbe airport**

The project for the construction of Glo-Djigbe airport will be carried out in the following stages:

- studies, dimensioning, geotechnics;
- general earthworks and life base;
- construction of infrastructure/ testing;
- commissioning.

#### 7.8.4.2. Glo-Djigbe development plan

The Glo-Djigbe development plan has been designed by the Government to avoid towns and villages and thus minimize physical displacement. The proposed area is part of the Governmentt notification of 10,000 Ha for the future development in the region and encompasses:

- domain A, with an area of 3,013 ha;
- domain B, with an area of 3,811 ha;
- domain C, with an area of 2,718 ha.

The detailed characteristics of the the development are not known yet.

#### 7.8.5. Valued environmental and social components

In the physical, natural and human environment surrounding the Project area, the following component have a peculiar value that requires they are considered in the cumulative impact assessment.

**Table 47 Valued environmental and social components**

Environment	Valued environmental and social components
Physical	<ul style="list-style-type: none"> <li>▪ Air quality and noise</li> <li>▪ Hydrology and hydrogeology</li> <li>▪ Geology, topography and soils</li> <li>▪ Landscape</li> </ul>
Natural	<ul style="list-style-type: none"> <li>▪ Protected areas</li> <li>▪ Habitat and flora</li> <li>▪ Fauna</li> <li>▪ Ecosystem services</li> </ul>
Human	<ul style="list-style-type: none"> <li>▪ Demographic and migrations</li> <li>▪ Women and gender issues</li> <li>▪ Vulnerable groups</li> <li>▪ Land tenure and land use</li> <li>▪ Economic activities, livelihoods and local economy (employment)</li> <li>▪ Habitat and settlements</li> <li>▪ Health and safety</li> <li>▪ Cultural heritage</li> </ul>

### 7.8.6. Cumulative impact assessment

The table below presents a summary of the cumulative impacts stemming from the implementation of the 3 projects in the same spatio-temporal framework.

Table 47 Cumulative impact assessment

\Components Projects	Air quality and noise	Hydrology and hydrogeology	Geology, topography and soils	Landscape	Protected areas	Habitat and flora	Fauna	Ecosystem services	Demographic and migrations	Women and gender issues	Vulnerable groups	Land tenure and land use	Economic activities, livelihoods	Habitat and settlements	Health and safety	Cultural heritage
GDIZ	Lo	Im	Mo	Mo	N	Lo	Lo	Mo	Mo	Im	Mo	Im	Im	Im	Mo	Im
Glo-Djigbe Development (10,000 Ha)	Lo	Im	Mo	Mo	N	Lo	Lo	Mo	Im	Im	Mo	Im	Im	Im	Mo	Im
New Cotonou (Glo-Djigbe) Airport	Im	Im	Mo	Mo	N	Lo	Lo	Mo	Im	Im	Mo	Im	Im	Im	Mo	Im
Number of impacting projects	3	3	3	3	0	3	3	3	3	3	3	3	3	3	3	3
Interaction type	Add	Syn	Add	Add	Add	Add	Add	Add	Add	Add	Add	Syn	Syn	Syn	Add	Add
Importance of impacts	Im	Im	Mo	Mo	N	Mo	Mo	Mo	Im	Im	Mo	Im	Im	Im	Mo	Im
Complementary measures	N	Y	N	N	N	N	N	N	N	N	-	Y	Y	Y	N	N

Impact: Positive: **Pos**; No impact: N; Low: **Lo**; Moderate: **Mo**; Important: **Im**;

Interaction addition: **Add**; Synergy: **Syn**; Opposition: **Ant**

Complementary measures: Yes: Y; No: N

The assessment of cumulative impacts reveals that the major cumulative impacts caused by the projects are **social impacts**. Thus, land tenure and land uses could be affected by synergy effects between projects and in turn, trigger other negative impacts.

Indeed, the projects will convert 13,000 ha of farm land, cultivated by thousands of small land owners and farmers, into land uses dedicated to tertiary sector and residential development. This transformation will have irremediable impacts on the local communities, leading to a loss in habitat and settlement with physical displacement but also to a massive shift in local economic activities causing widespread economic displacement, unemployment, loss of incomes and poverty, food insecurity, along with various social ills (delinquency and crimes, prostitution, dislocation of communities and families) caused by massive job seekers migrations in the area and progressive urbanization.

Although the proposed projects should be able to provide jobs to farmers who will lose their land through a massive job creation, it is not sure whether these farmers will have the will or capacities to take on these jobs, especially for older farmers who are less flexible than younger ones. Besides, even though they accept these jobs, the delay between land acquisition and project operation means that



they will remain vulnerable to food insecurity since their food intakes largely rely on their own agricultural production. This food insecurity could last for years if the project construction is delayed.

It is worth noted that the management of social impacts will be key to ensure that the government projects are well accepted among local communities and that their shift towards new economic activities is accompanied by adequate measures.

So far, the management has not been efficient because:

- There has been a strong opposition to the airport project.
- Farmers who lost their land for the airport bought land in the Project area and risk being expropriated twice.

Two major environmental impacts can also be observed in case of a concomitant development of the projects. These impacts are:

- **Soil sealing.** All these projects will convert 13,000 ha of agricultural and natural land in an impermeabilized area. The rainwater that initially infiltrates in soil will be accumulated leading in increase of the runoff volume. If these volumes are not managed or mismanaged, problems related to flooding or water stagnation could be observed, and trigger other negative impacts, like impacts on human health or water pollution. The volume of water runoff and infiltrated water and in general the hydraulic scheme of the area must be studied at the projects scale in order to properly define scaled measures for the runoff management.
- **Water supply.** Taken one by one, these projects will consume a significant volume of water, for drinking water as well as for process water. To date, this impact appears to be important due to the lack of knowledge on the aquifer dynamics and the available resources. The future cumulative water needs could strongly affect the capacity of the water reservoir, and in a context of climatic change where water pressures are more and more important, this could potentially lead to water scarcity, especially during dry season.

#### 7.8.7. Complementary measures

The main complementary measures are to:

- Develop a Strategic Environmental and Social Impact Assessment which will cover the 3 projects.
- Set up a committee involving representatives from the 3 projects, who will have to propose a strategy for the management of social impacts and especially:
  - A **global land acquisition strategy** covering the 13,000 ha which will provide clear guidelines on the acquisition process and responsible entities (including RAP production), eligible persons, compensation rates.
  - A **large-scale program for livelihood restoration** for all the project-affected persons, resting on the massive conversion of farmers into tertiary workers through training and capacity-building.
- Undertake **large-scale hydrogeologic and hydraulic study** to characterize issues and impacts of disturbance on the natural hydraulic scheme, aquifer volume and its ability to refill in order to provide enough water for the projects needs as well as the current uses.



## 8. Analysis of the risks of technological accidents

### 8.1. Hazard analysis

#### 8.1.1. Hazards related to the external environment

These dangers are related to neighboring external installations and risks of natural origin (earthquake, storm, lightning, flood, etc.). Steps must be taken to ensure that the effects of accidents originating from outside the unit do not reach the unit's installations.

GDIZ is subject to the risk of flooding because of the difficulty of infiltrating meteoric water which can fall in large quantities on poorly permeable soil. Infrastructures could be damaged by stagnant water. Arrangements to collect and channel runoff from the site are however planned during civil engineering work to avoid this risk.

**Despite these means put in place, the risk of flooding is considered as a potential source of danger.**

The risk of lightning also exists. An electric shock can trigger a fire that is detrimental to the installations.

Regarding the seismic risk, as Benin is subject to very low seismic risk, this is not taken into account.

#### 8.1.2. Hazard related to technological environment

GDIZ and its infrastructures (CETP/STP, substations, composting trenches and waste transfer stations) are expected to be bordered by a new highway and located close to industrial activities and the airport. Nevertheless, as this road does not yet exist, as well as the industrial activities or the airport, no danger potential can be therefore retained.

#### 8.1.3. Hazard related to human environment

GDIZ and its infrastructures (CETP/STP, substations, composting trenches and waste transfer stations) will be surrounded by a fence delimiting access to the infrastructures and will be guarded by a security team. Maintenance/operational technicians will also be permanently present. Malicious act is not identified as a potential source of danger furthermore because it is addressed in the ESIA with provision of dedicated security measures (cf. § 10.4.10).

#### 8.1.4. Hazards related to equipment and operations

In this part, the various processes implemented within the framework of the Project are analyzed in order to determine what are the potential dangers associated with the various equipment and operations. The potential dangers of operations and equipment are determined from the dangerousness of the products used and the operating conditions and possible drifts.

Table 48 Hazard related to operations

Equipment / operation		Identified risk	Means of control
Operation		Start of fire (lightning, overheating of connection cable, short circuit, installation fault, heat, bad storage, etc.)	Choice of quality material Staff training Compliance with strict standards Security systems Maintenance Fire fighting means
Maintenance		Start of fire (work by hot spot, bad handling, etc)	Staff training Fire permit Monitoring after works Fire fighting means
		Spill of product	Staff training Limited product quantity
Machine room	Transformer	Start of fire (short circuit, aging, lightning, etc.)	Electrical equipment to standards Regular maintenance Authorized personnel Automatic shutdown system Fire fighting means
		Oil spill	Watertight and retention room
	Technical area	Inflammable liquid spill	Watertight and retention room Presence of extinguishers in the room
Access road		None	/
Electric cables		Start of fire (short circuit, aging, lightning, etc.)	Electric cables to standards Buried cables materialized for prior identification in the event of excavation work
Electric line		Fall of electric pole on third parties or installations	Installation of posts outside risk areas Construction according to current standards

### 8.1.5. Hazard related to products used

The purpose of identifying potential hazards is to identify the hazards associated with products (substances or preparations). This involves qualifying the risks (flammability, toxicity, etc.) presented by the products or substances present or likely to be present on the site in significant quantities.

#### Waste transfer stations:

Product	Storage	Identified risk	Dangers
Dangerous waste	Transfer stations	Waste incompatibility	Explosion Fire Release of flammable, toxic or asphyxiating gases

### Composting trenches

Product	Storage	Identified risk	Dangers
Organic waste	Composting trenches	Heat accumulation	Fire Release of carbon monoxide (as all fire)

### Wastewater treatment plant

As the wastewater treatment processes are not yet communicated, used products are unknown.

### Substations

Product	Storage	Identified risk	Dangers
Oil	In the machine room (transformateur)	Oil leak High flash point, no fire hazard	Pollution
Diesel	In the machine room	Leaking liquid cans and source of ignition	Incendie
SF6	High-voltage equipment	Degradation of air quality	/

## 8.2. Measures proposed

The proposed measures can be summarized as follows:

- **prevention:** measures taken to limit the risk of nuisance from a disaster, its possible spread and its consequences on the normal operation of the installations;
- **forecast:** measures taken to deal, if necessary, with any disaster with a view to limiting the damage and facilitating the action of the emergency services;
- **intervention:** measures taken with a view to effectively implementing the means of combating the disaster, regulating traffic and the correct evacuation of victims through the existence of an organization for disaster management.

### 8.2.1. Prevention

#### 8.2.1.1. Waste transfer station

Following prevention measures shall be studied and developed in order to avoid the risk of mixing incompatible waste:

- Reinforcement of waste acceptance procedures
- Vigilance on the organization of storage and product compatibility
- Vigilance on regrouping / stripping / transport operations
- Establishment of suitable monitoring / control means: infrared detection / video surveillance, sprinkling devices, gas collection / treatment devices, with regular tests of proper functioning
- Definition of measures to be implemented in an emergency

- Workers training

#### **8.2.1.2. Composting trenches**

Following prevention measures shall be studied and developed in order to avoid the risk of fire:

- Respect the authorized volumes and heights
- Fragment the piles (distance to prevent the spread of fire: ~ 15 m)
- Avoid overly imposing heights favoring the accumulation of heat (especially on wood storage because green waste is limited to 3m or 5m.
- Monitor core temperatures very regularly ( $T > 55^{\circ} \text{C}$  is part of the composting process) and humidity.
- Pay attention to the problem of water resources due to long firefighting times with heavy means. Provide for the recovery of rainwater and firewater for reuse with intermediate basins to “filter” the recovered water (settling basin, screen, etc.)

#### **8.2.1.3. Substations**

The electrical and electromechanical installations will be carried out according to CONTRELEC standards and maintained in good condition. They must be checked periodically by a competent technician followed by SBEE (Beninese Electric Power Company) agents and the control reports made available to the emergency services.

Substation must have a suitable fleet of extinguishers in sufficient numbers according to the standards, located in appropriate place and safety instructions well applied by the staff. The measures to be followed first in the event of a fire will be established and communicated.

#### **8.2.1.4. Wastewater treatment plants**

The effluents that will come from the unit must meet the standards for discharge into the natural environment, in accordance with the provisions of Decree n°2001-109 of 04 April 2001 setting the quality standards for wastewater in the Republic of Benin or IFC standards.

### **8.2.2. Forecast**

Whatever preventive measures are taken, zero risk will never be reached. Therefore, arrangements will have to be made to deal with any disaster, if any.

#### **8.2.2.1. Firefighting measures**

Regarding firefighting, it will be necessary to set up:

- a water network consisting of a reserve of water under a certain pressure supplied by a high-capacity booster pump or motor pump;
- firefighting equipment (gas extinguisher, etc.);
- an alarm system;
- fire instructions posted at the site entrance and in risk areas;
- a traffic plan: all arrangements must be made to indicate the direction of traffic for persons and vehicles on the site.

Traffic signs and gates to control entrances and exits will greatly help to regulate traffic in order to avoid accidents on the site.

#### **8.2.2.2. Intervention**

The taking of the listed measures will concretize the fact that the installations are equipped with adequate means of protection. The provisions in the area of intervention are described below.

##### **8.2.2.2.1. Staff training**

Unit personnel should be trained in disaster prevention and the use of firefighting equipment and subjected to periodic simulation exercises. In addition, the site will house a fire fighting station.

##### **8.2.2.2.2. Site emergency response plan**

The purpose of the emergency plan is to identify the risks linked to the construction and operation of GDIZ and to organize the adequate material and human resources to fight against fire, explosion and pollution.

Also, certain events, such as those presented below in a non-exhaustive manner, would trigger the emergency plan:

- serious bodily injury;
- fire or explosion;
- events threatening the natural or biological environment.

During the implementation of the Project, the application of the emergency plan will be ensured by a designated responsible person. The latter must be qualified in terms of security and, during the various meetings that will be organized, the intervention personnel will be informed of the keeping of the plan in question in order to be able to manage an emergency situation.

The site emergency response plan should cover, in line with ARISE ESMS manual, the following aspects:

- Applicable legislation requirements and reference and contact details of local government agencies;
- Identification of emergency situations that may occur;
- Individuals that may be impacted (including communities if any);
- Roles and responsibilities;
- Emergency response Standard Operating Procedures (SOP);
- The provision of equipment and resources and designation of responsibilities for emergency preparedness and response;
- Communication procedures, including that with potentially affected communities and local government agencies;
- Periodic training in order to ensure effective response to possible emergency situations;
- Periodic emergency drills, involving Affected Communities and in order to ensure preparedness to possible emergency situations;
- Business continuity and contingency.

## 9. Public consultation and participation

The objective of public consultation and participation is to ensure that the persons and groups directly affected by the Project, frequently called stakeholders, receive clear and transparent information about it. It is also an opportunity to collect the expectations and grievances of these persons or groups, in order to improve the ESIA and to propose impact mitigation measures that correspond to the expectations and needs expressed by the individuals who have been consulted.

Although the ESIA is an adequate moment to carry out the preliminary consultation of stakeholders, public participation must take place throughout the life of the Project and must be planned upstream in order to maximize the positive spinoffs of such a strategy.

In order to establish such planning, a Stakeholder Engagement Plan (SEP) is usually implemented at the same time as an ESIA. The SEP for the GDIZ Project is presented in Annex III of the ESIA.

### 9.1. Objectives of the consultation process

Public consultation is an important and essential step in carrying out an environmental impact study because it will allow persons, groups or villages concerned by the Project to have access to technical information, to express their opinions on the Project and to highlight, among other things, the collective values that must be considered in decision-making.

Public consultation verifies that there are no unintended consequences for the implementation of a Project, and as a result, it can avoid future expenses for environmental corrective measures. Public opinion therefore plays an important role in the environmental impact assessment process. It is separate from the public hearing procedure, which is a regulatory procedure allowing environmental authorities to ensure that the Project does not raise any major objections and that the opinions of stakeholders have been taken into account in the impact study.

Public consultation, in the end, makes it possible to establish ownership and effective involvement by the populations concerned in the Project in all its phases, and therefore to put in place the mechanisms that guarantee their social support, among others Project.

For the GDIZ Project, the consultation process took 2 forms:

- **Preliminary consultations** held with communities of the study area during the social field data collection. It mainly focused on informing villages in the study area about the Project, its main characteristics and its potential impacts.
- **ESIA disclosure consultations:** the ESIA disclosure aimed at presenting the major ESMP measures to be implemented by the Project to minimize environmental and social impacts.

### 9.2. Preliminary consultation process

#### 9.2.1. Meetings carried out

It is in this context that several meetings and interviews have been carried out with populations, socio-economic community groups, Civil Society Organizations (CSOs) and local authorities in the municipalities of Tori-Bossito and Ze and their respective districts, Tori-Cada and Tangbo Djevie which house the Project site.



The main purpose of these meetings was to collect data on the local socio-economic context in order to complete the initial state of the human environment in this impact study. They also made it possible to inform the population about the Project (nature and description, delimitation, likely impacts for residents) and to collect their perceptions and opinions, their fears, expectations.

These consultations took 4 forms:

- preparatory meetings and site visits with local authorities, in order to show them the limits of the future site of the industrial zone;
- two public consultation meetings in the 2 arrondissements of the Project study area;
- 22 focus groups with different socio-professional and socio-demographic categories, which aimed both to collect socio-economic data and to exchange on the Project;
- individual interviews with key stakeholders to fully understand the functioning of the land system in the Project area and identify the constraints to land acquisition.

Due to opposition to the Project, the village of Agbodjedo was not covered by the various consultation activities.

In Annex XI are presented the handwritten minutes, the reports and the attendance lists compiled for meetings with local authorities and public consultation meetings organized at the level of the districts of Tori-Cada and Tangbo-Djevie.

Annex XII presents a summary of these consultations as well as a summary of the discussions held during the organized discussion groups. From this summary, it is possible to learn about the expectations and fears expressed by each socio-demographic or socio-professional group.

The table below shows the activities carried out.

Table 48 : Summary of the institutions and groups met

Date	Locality	Institution or group met	Duration of the meeting	Number of participants	Men / women
29 /10/2019 at 15h	Ze town hall	Preparatory meeting Mayor of Ze	2h	3	1 man and 2 women
30/10/ 2019 at 9 a.m	Tori-Bossito town hall	Preparatory meeting Mayor of Tori-Bossito	2 h	4	2 men and 2 women
30/10/ 2019 at 1:30 p.m	Tangbo- Djevie district in Ze	Preparatory field meeting with the local authorities (CA and CV) concerned in the Arrondissement of Tangbo- Djevie in Ze	2h	8	6 men 2 women
31/10/2019 at 3 p.m	Tori - Cada district	Preparatory field meeting with the local authorities (CA and CV) concerned from the District of Tori - Cada	2h	09	07 men 02 women
11/11/2019 at 4 p.m	Tori - Cada district	Public consultation with local residents of the Tori - Cada District Project site	3h	54	52 men 02 women
14/11/2019 at 10 a.m	Dokanme	Focus group with the village chief, councillors and religious leaders	2h	16	14 men 02 women
15/11/2019 at 10 a.m	District of Tangbo- Djevie in Ze	Public consultation with the persons living in the vicinity of Tangbo- Djevie Project site.	3h		
19/11/2019 at 10 a.m	Dokanme	Focus group with Dokanme youth group	1h 30	36	34 men 02 women
19/11/2019 at 14 a.m	District of Tori – Cada	Focus group with the village chief, his councillors and the religious leaders of Zebe	2 h	11	09 men 02 women
20/11/2019 at 10 a.m	Zebe	Focus group with Zebe youth group	2 h	19	14 men 05 women
20/11/2019 At 3 p.m	Gbetaga	Focus group with the village chief, his councillors and the religious leaders of Gbetaga	2h	15	13 men 02 women
21/11/2019 at 10 a.m	Dokanme	Focus group with the women of Dokanme	2h	34	01 men 33 women
21/11/2019 at 4 p.m	Zebe	Focus group with Sogbe women's group	2 h	15	11 men 04 women
22/11/2019 at 10 a.m	Zebe	Focus group with the vulnerable groups of Zebe	1h	11	06 men 05 women
22/11/2019 At 2 p.m	Sogbe	Focus group with the village chief, his councillors and the religious leaders of Sogbe	2h	11	09 men 02 women

Date	Locality	Institution or group met	Duration of the meeting	Number of participants	Men / women
23/ 11/2019 at 3 p.m	District of Tori – Cada	Focus group with the craftsmen and merchants of Tori-Cada District	1h30	15	10 women 05 men
25/11/2019 at 9 a.m	District of Tori – Cada	Focus group with the Associations/CSOs of Tori-Cada District	1h30	21	16 men 05 women
25/11/2019 at 4 p.m	District of Tori – Cada	Focus group with farmers, stockbreeders and landowners of Tori-Cada District	2h	14	12 men 02 women
30/12/2019 at 9 a.m	District of Tangbo- Djevie in Ze	Public Consultation with the residents of Tangbo-Djevie in Ze	2h	39	34 men 05 women
31 /12/2019 at 9 a.m	District of Tangbo- Djevie in Ze	Focus group with Operators and Owners	2h	26	24 men 02 women
02/01/2020 at 2 p.m	District of Tangbo- Djevie in Ze	Focus group with Tangbo-Djevie Association/CSOs	1h30	15	13 men 02 women
02/01/2020 at 4 p.m	District of Tangbo- Djevie in Ze	Focus group with the Craftsmen and traders of Tangbo- Djevie	1h30	17	12 men 5 women
03/01/ 2020 At 9 a.m	Houeze	Focus group with village chief, councillors and religious leaders	2h	12	10 men 02 women
03/01/ 2020 At 3 p.m	Houeze	Focus group with young people	1h30	19	17 men 02 women
04/01/2020 at 9 a.m	Djitin- Aga	Focus group with village chief, councillors and religious leaders	2h	15	13 men 02 women
04/01/2020 at 2 p.m	Houeze	Focus group with vulnerable groups	1h	11	08 men 03 women
06/01/2020 at 9 a.m	Anavie	Focus group with village chief, councillors and religious leaders	2h	18	13 men 05 women
06/01/2020 at 4 p.m	Djitin- Aga	Focus group with the women of Djitin- Aga	2h	22	21 women 01 man
07/01/2020 at 9 a.m	Anavie	Focus group with young people	1h30	18	16 men 02 women
14/01/2020	Cotonou	Meeting with IGN	1h	3	-
15/01/2020	Cotonou	Meeting with ANDF	1h	3	-
15/01/2020	Cotonou	Meeting with APIEX	1h	5	-
15/01/2020	Cotonou	Meeting with AGETIP Benin SE	1h	10	-

## 9.2.2. Summary of the concerns and wishes expressed

### 9.2.2.1. Fears and concerns

The various consultation activities with local Project stakeholders revealed great fears about the Project and strong opposition to it, which was concretely materialised by the refusal of the populations to take part in consultation activities and in some villages focus-group activities.

In both Ze and Tori-Cada, the majority of those consulted expressed their rejection of the Project on the grounds that it would "uproot" them from their land again (referring to the airport project). Indeed, the experience of the airport seems to have been very badly experienced by the local residents who were deprived of their land and feel that they have not received compensation corresponding to the real value of their property.

Moreover, in the 2 municipalities visited, the populations expressed the wish that the authorities should take it upon themselves to send a delegation to present the Project to them. They did not appreciate the fact that the information was transmitted by Antea Group without official representation of the Project authorities.

The main fears expressed relate essentially to the expropriation that will be required to free up the land for the Project and all the social consequences that this may have. Local residents fear that they will not be compensated at fair value, that they will not be able to find other sources of income and that they will be exposed to hunger. Local populations fear that expropriation will severely affect village social organization by leading to a loss of reference points, cultural values and norms, and a dislocation of the social order with an increase in delinquency and criminality. The effects of expropriation on family stability are also feared, with individuals fearing the dislocation of families as a result of men's inability to provide for their homes and the increase in female prostitution. The negative psychological effects of expropriation, which cause anxiety and concern, could also have a negative impact on family stability.

Local residents are also afraid that they will not have jobs on the Project site: they think it will be difficult for them, whether farmers or craftsmen to find work in an industrial zone or at the future airport because of their lack of qualifications. The women fear that they will not have opportunities to sell their goods at the Project site. Finally, they fear the development of diseases due to the nuisances and pollution brought by the Project.

#### **9.2.2.2. Expectations and recommendations**

Many proposals were made by the various groups interviewed in order to minimize some of the negative impacts of the Project. Among these, the proposal to identify a site for the industrial zone within the future airport itself or to relocate the site to another area initially planned for industrial development (in the municipality of Ze).

In order to minimize the harmful effects of the expropriation, the populations asked that they should be allowed to harvest their crops before the beginning of the works (in particular pineapple, which requires 2 years of growth) and not to destroy the crops before the works actually start. The populations draw a parallel with the management of the expropriation in the context of the airport Project, during which the crops were destroyed even though work has not yet begun. The local residents are demanding real and fair compensation from the owners and operators before work begins. They want priority to be given to offering jobs on the Project site to farmers who will be expropriated so that they can quickly regain a source of income, or to help them find other land to cultivate.

Requests are also made to give priority to offering jobs to young people from villages in the area who have diplomas and the skills required to work on the site, but also to women.

Recommendations are made on the respect of local standards by future workers on the site. Finally, many requests have been made for the Project to strengthen local infrastructure: health, water,

education, electricity, access roads, are all areas that the local residents would like to see improved, thanks to the Project.

### 9.2.2.3. Integration of stakeholders 'inputs into ESIA

In order to take into account, the expectations and fears of the populations living along the shoreline of the Project, the following measures have been integrated into the ESIA and the ESMP:

- sensitizing workers to local customs;
- establishment of a recruitment program that prioritizes expropriated PAPs and women from villages in the area;
- establishment of a Voluntary Community Development Program by the proponent to finance the construction of infrastructure in villages bordering the Project site (see 10.3.5).

In the RAP, a special consideration for the following measures will have to be made:

- provision of fair compensation corresponding to the real value of the assets especially for land;
- alignment of the Project schedule and the work start-up period with the harvesting periods of the main crops on the site;
- establishment of a robust livelihood restoration program under the RAP.

## 9.3. ESIA disclosure consultation process

Public consultations for the disclosure of the ESIA were organized from the 3<sup>rd</sup> to the 12<sup>th</sup> of November 2020. The purposes of these consultations were to present the main conclusions of the ESIA process, the major impacts of the Project and the proposed mitigation measures, and to get the feedback of project-affected communities on these measures. Various communication tools were used, mostly a poster and a PowerPoint. The Covid-19 prevention measures applicable in Benin were applied during the meetings.

Prior to the organization of consultation meetings in the villages of the study area, two meetings were organised at the level of the municipalities concerned by the Project:

- 03/11/2020: meeting with the Municipality of Tori-Bossito.
- 05/11/2020: meeting with the Municipality of Ze.

Following these, public meetings were organised in the 8 villages affected by the Project so that information was brought directly to the Project-Affected Persons with the aim of increasing public participation.

The meetings are presented in the table below. A total of 392 participants were enumerated, with 71% of men and 29% of women.

**Table 49 : ESIA disclosure consultations organised**

Date	Village	Duration of the meeting	Number of Participants	Men/ Women
04/11/2020	Houeze	2h10	53	30 Men 23 women
04/11/2020	Djitin-Aga	1h30	51	49 Men 2 Women
06/11/2020	Anavie	1h35	36	33 Men 3 Women
06/11/2020	Agbodjedo	1h25	52	28 Men 24 Women
10/11/2020	Sogbe	1h50	52	33 Men 19 Women
10/11/2020	Gbetaga	55 min	45	20 Men 25 Women
11/12/2020	Zebe	1h30	49	45 Men 4 Women
12/11/2020	Dokanme	1h15	57	41 Men 13 Women
TOTAL			392	279 Men (71%) 113 Women (29%)

A summary of these consultations and their transcripts and attendance lists are presented in Annex XII and Annex XIV of the ESIA.



## 10. Environmental and social management plan

### 10.1. Objectives of the Environmental and Social Management Plan

The Environmental and Social Management Plan (ESMP) is the program for implementing and monitoring the measures envisaged to eliminate, reduce and possibly compensate for the damaging consequences of the Project on the various environmental and social components. This program will establish the environmental clauses that will be attached to the Certificate of Environmental Compliance issued by the Ministry of the Living Environment and Sustainable Development. The integration of the planned measures into existing environmental management provisions will reflect the commitment of GDIZ, the Project promoter, to sustainable development.

Moreover, the ESMP provides the ESMS framework with the key elements for developing and implementing an overarching ESMS which sets out how the mitigation and monitoring will be implemented, checked and reviewed during the life of the Project.

The findings of the ESIA are used to develop associated documentation, such as the ESMP and Framework ESMS, as shown below:

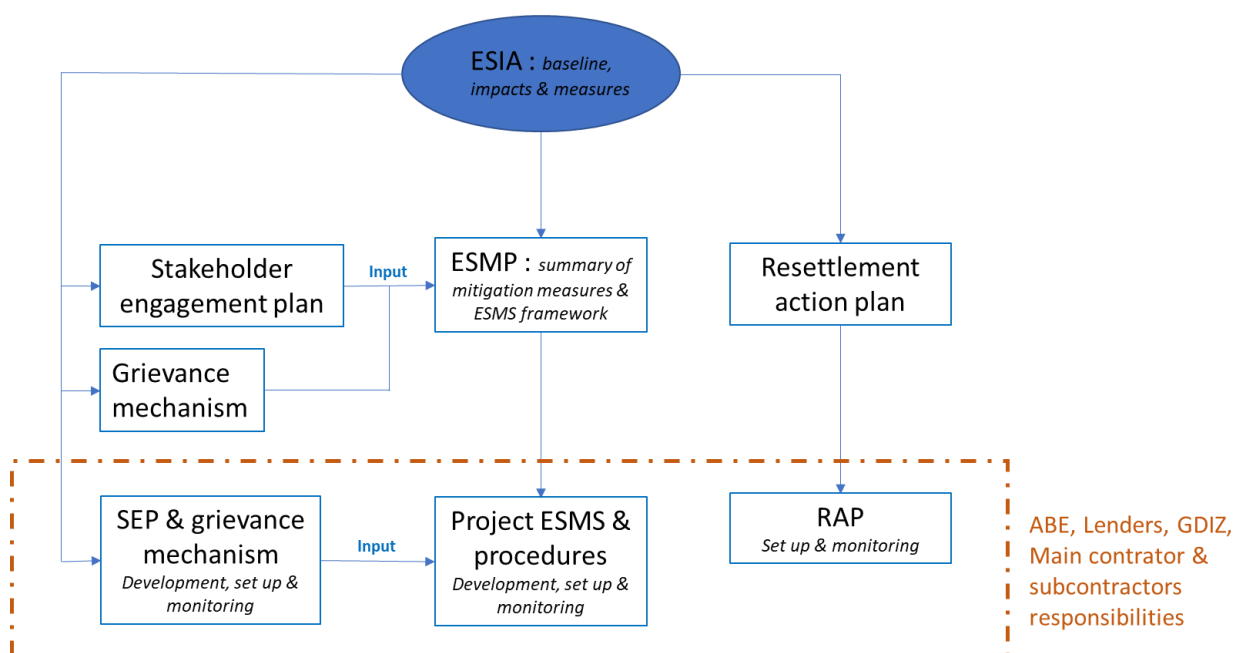


Figure 111 ESMP documents interrelation

### 10.2. Environmental and social management system framework

#### 10.2.1. GDIZ ESMS

GDIZ company will comply with the **ARISE ESMS manual** in all its own operations. This document already exists and detail the structure and procedures that ARISE applies to its own activities and projects and require from its contractors. ARISE ESMS is a corporate system that applies to ARISE company and all its country-based projects, encompassing GDIZ Project in Benin.

It is supported by several associated corporate policies which are presented in § 3.5.1.

The ESMS manual presents:

- Applicable legislation, standards, policies and other regulatory requirements covering IFC Performance Standards and international conventions and treaties to which ARISE commits to respect.
- Environmental and social sustainability policy, regulation and procedures:
  - Environmental, health and safety procedures covering:
    - OHS hazards and risk identification
    - Client and supplier HSE plan and conditions
  - Environmental and social procedure covering:
    - Health and safety planning
    - Emergency preparedness and response planning (EPRP)
    - Occupational Health and Safety Management Plan
  - Employee protection policy covering:
    - Fair employment policy
    - Sexual harassment policy
    - Worker's complaint mechanism
    - Whistleblower policy
- Communication and stakeholder engagement:
  - Stakeholder engagement plan
  - Grievance mechanism
- ESMS implementation and operation:
  - Roles and responsibilities
  - Training, awareness and competences
  - Documentation
  - Emergency preparedness and response
  - Monitoring and evaluation

Based on this manual and the present ESIA/ESMP study, GDIZ will develop its Project ESMS that should cover, in line with ESMS best practices, the following:

- Legislation, standards and policies: International standards (IFC Performance Standards, Environmental, Health and Safety (EHS) Guidelines, etc.) and beninese legislative requirements to which the Project abides, corporate policies (HSE, human resources, sustainable development, etc).
- Mitigation measures, plans and procedures: all management program used to mitigate potential environmental and social risks and impacts and address specific issues in the appropriate level of detail.
- Organisational capacity and competency: roles and responsibilities, training program, etc.
- Support documentation: risks and impact assessment document, legal and international requirements, monitoring and review, internal and external communication, human resources, SEP, etc.

- Monitoring actions: monitoring (intended as measurements) actions that the plan intends to implement.
- Audit and review: audit and review scheme for ensuring the correct implementation of the ESMS.
- Reporting: requirements for reporting the results of the monitoring activities and the performance against Targets/Acceptance criteria set out in the plan, as well as reporting frequency and responsibilities.

### 10.2.2. ESMS management scheme

An ESMS is designed to establish a methodological approach to managing environmental and social risks and impacts in a structured way on a continuous basis. This ESMS has to be managed with an appropriate and effective structure both for construction and operation phases of the Project. The scheme below presents an overview of the ESMS management scheme.

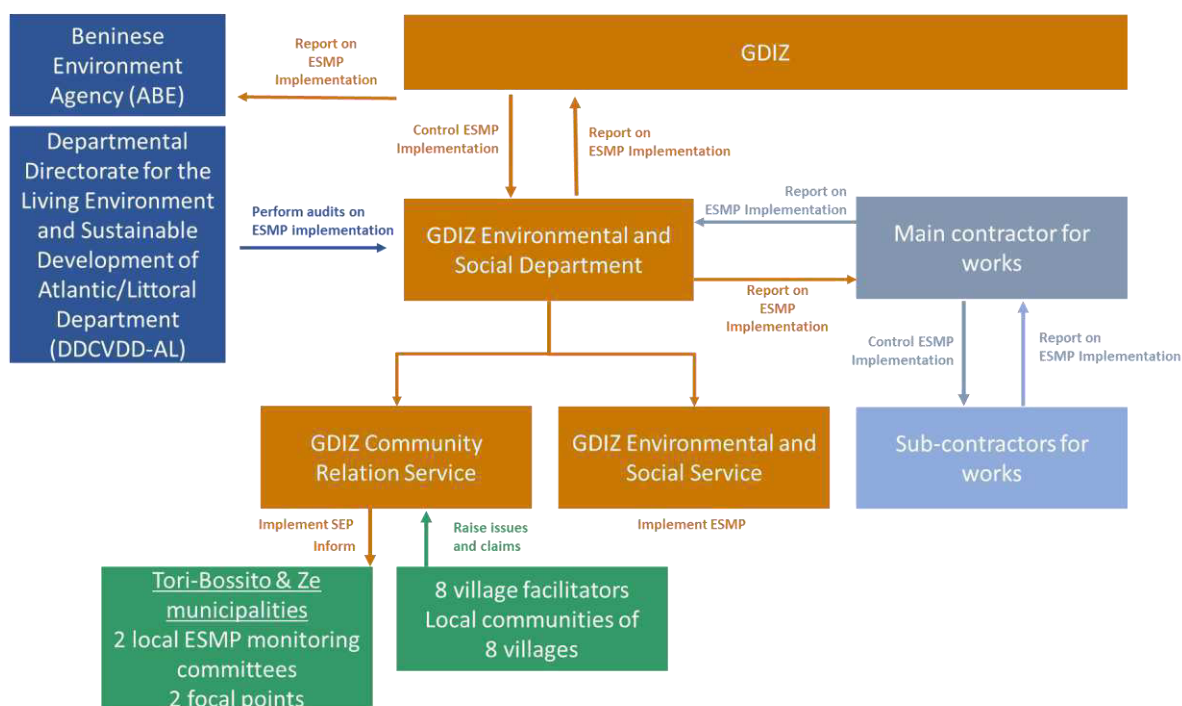


Figure 112 : ESMS Management Scheme

The following sections provide more details on the functioning of this scheme and the role and responsibilities of each actor.

### 10.2.3. Institutional framework

It brings together all national institutions with direct or indirect competences in environmental decision-making. The following institutions are the most concerned:

- Ministry of the Living Environment and Sustainable Development through the following institutions:
  - General Directorate of the Environment;
  - Beninese Agency for the Environment;
  - General Directorate of Water, Forests and Hunting.

- Prefecture of the Atlantic Department and especially its Departmental Directorate of the Living Environment and Sustainable Development of the Atlantic-Littoral Department (DDCVDD – AL);
- Ze and Tori-Bossito municipalities;
- Districts of Tori-Cada and Tangbo-Djevie;
- Representatives of the affected populations in the 8 villages.

#### **10.2.4. Actors involved and responsibilities of the various stakeholders**

Several actors will work together to ensure the implementation of the ESMP. They are presented below.

##### **10.2.4.1. Role of the promoter**

The promoter, in this case GDIZ, is responsible for the coordination of all environmental and social activities related to the Project throughout its preparation, construction and operation.

It must have an Environmental and Social Department (ESD) whose roles will be to:

- ensure that the environmental and social aspects defined in this ESMP are integrated into the main contractor tender documents;
- ensure the implementation of the actions of the ESMP that are the responsibility of the promoter;
- conduct the environmental and social monitoring of the main contractor in charge of the works and its subcontractors during the construction phase;
- conduct environmental and social monitoring of the industrial units located in GDIZ once it is in operation.

This department is made up of an Environmental and Social Director, an HSE Manager and a Social Manager. These persons will have to present diplomas level which correspond to the positions they will be required to occupy, and significant experience (more than 5 years) in the same type of position.

The promoter will also have to form a Community Relations Service (CRS) which will be made up of a community relations team and village facilitators. This service will be attached to the ESD and managed by a manager under the responsibilities of the E&S Director. The detailed composition of this service is presented in paragraph 10.3.2.4.4.

The scheme below presents the overall structure of the E&S Departement.



Figure 113 : E&S Departement structure

Depending on the phase of the Project, the role of the Environmental and Social Department will be as follows:

- **Project preparation phase:**

- coordinate with the various stakeholders the definition of E&S measures and the preparation of clauses relating to the environmental obligations of companies to be included in the tender documents;
- participate with other stakeholders in the evaluation of offers and negotiations with companies for all E&S aspects;
- set up the E&S management system (ESMS);
- implement the RAP;
- ensure the consistency of the specific E&S management plans (ESMP Construction Site) of the contractor(s) in charge of the works;
- ensure, with the various stakeholders, the monitoring and coordination of all consultations initiated with local populations prior to the start of construction.

- **Construction phase:**

- monitoring and coordinating the activities and implementation of the various plans;
- in the field, participate to regular E&S coordination meetings with the representatives of the contractor (s) in charge of the construction work;
- perform surprise construction site visits to realise on-the-spot E&S audits;
- plan, manage and conduct the contractor's environmental and social audit programs to be performed by the HSE manager;

- prepare quarterly monitoring reports for ABE, based on E&S activity reports received from the contractor(s).
- **Operation phase:**
  - monitoring and coordinating the environmental activities required on the site;
  - perform surprise industrial site visits to realise on-the-spot audits;
  - plan, manage and conduct the industrial site E&S audit programs to be performed by the HSE manager.

#### 10.2.4.2. Roles of the main contractor and its subcontractors

The main construction company and its subcontractors will establish environmental and social units (ESUs) within their teams, dedicated to monitoring the implementation of environmental and social measures and evaluating the efficiency of these measures. Each contractor will be responsible to recruit qualified personnel to perform all the environmental and social tasks as requested in the environmental and social specifications of the tender documents. The number of personnel to be recruited and their profile is left to the contractor.

In each company, ESU will be responsible for the environmental aspects directly linked to construction activities and the social aspects linked to complaints expressed by the population, nuisances suffered, requests for compensation for temporary events taking place during construction activities and relations with traditional local authorities or representatives of the State. The ESUs will perform the following tasks:

- ensure environmental and social coordination with the promoter's ESD (Environmental and Social Department);
- ensure that all the environmental plans and programs prepared have been submitted to the ESD;
- ensure construction activities comply with the environmental and social obligations defined in the specifications (environmental specifications);
- verify that environmental obligations are effectively implemented on the sites;
- participate in site monitoring meetings and prepare a monthly environmental monitoring report for the site;
- ensuring relations with the local communities concerned for all social aspects, including improving community health, compliance with recruitment procedures, land use agreement, handling of complaints, public consultation;
- organize a database for the storage of all environmental documentation generated during the construction of the Project;
- prepare weekly and monthly activity reports presented to the monitoring committee;
- prepare the required documentation prior to the environmental and social audits of the Project.

#### 10.2.4.3. Beninese Environment Agency

In accordance with Decree No. 2010-478 of 05 November 2010, the Beninese Environment Agency (ABE) is a social, cultural and scientific office with legal personality and financial autonomy. It is the organ responsible for implementing the environmental policy defined by the Government as part of the general development plan.



Among other things, ABE is competent with:

- the implementation of strategic environmental assessment (SEA) and environmental impact assessment (EIA) procedures and the evaluation of ESIA reports;
- the implementation of procedures relating to environmental audits;
- preparation of procedures for monitoring and implementing environmental emergency plans;
- development and monitoring of environmental procedures.

According to the provisions of the Environmental Framework Law, ABE provides technical advice to MCVDD, its supervisory ministry and even to the Government on the authorization to undertake works or operate establishments subject to an ESIA, on the environmental feasibility of the plans, programs and projects to be carried out and on the initiation and execution of the external environmental audit. Thus, it is in charge of examining applications and files concerning the environmental assessment procedures prescribed by Decree No. 2017-332.

In order to propose an overall approach to the ESIA process by project typology, ABE has drafted several guides for all project stakeholders to help and support them in the process to be set up and the human and technical resources to be mobilised.

The entire Project, both during the construction, operation and dismantling phases, must remain under the control of ABE to ensure compliance with the Minister's decision to issue the ECC. This aspect is the responsibility of ABE, which is responsible for monitoring and ensuring compliance with environmental legislation and regulations. Thus, the environmental monitoring and follow-up reports attesting to the proper implementation of the ESMP and its effectiveness will be approved and validated by the ABE. ABE will work in concert with the environmental units of the municipalities and the decentralized authorities of the State which also have competences in environmental matters.

#### **10.2.4.4. Departmental Directorate for the Living Environment and Sustainable Development of Atlantic/Littoral Department (DDCVDD-AL)**

DDCVDD-AL is responsible for implementing, at the departmental level, the national policy in terms of living environment and sustainable development and for monitoring MCVDD projects in the field and reporting periodically to the prefect and the minister. It manages sectoral action plans, technical assistance and advisory support to municipalities in accordance with the laws on decentralization.

More specifically, it is responsible for:

- assisting the municipal and departmental authorities on matters within their areas of competence;
- developing and contributing to the implementation of the department's decentralization and deconcentration plan in application of the national decentralization and deconcentration policy;
- monitoring and controlling the application of standards and legislative and regulatory texts relating to the environment, nature protection, town planning, sanitation, urban roads, urban mobility, housing, construction and mapping;
- monitoring all the activities of the municipalities contributing to the improvement of the living environment of the populations.

The DDCVDD concerned here is that of the Atlantic-Littoral.

#### 10.2.4.5. Local ESMP monitoring committee

In order to facilitate the supervision of the Project by the local authorities and in particular by the mayors of the municipality of Tori-Bossito and Ze, the district chiefs of Tori-Cada and Tangbo-Djevie, and the chiefs of the 8 villages concerned by the Project, 2 local ESMP monitoring committees will be set up on the initiative and with the support of the promoter:

- **Tori-Bossito Committee:** A committee at the level of the municipality of Tori-Bossito, bringing together the Mayor or a selected representative, the district chief of Tori-Cada and the chiefs of the 4 villages concerned by the Project: Gbetaga, Sogbe, Zebe and Dokanme. The representative of the municipal environmental unit will also be a member of this committee.
- **Tangbo-Djevie Committee:** A committee at the level of the municipality of Ze, bringing together the Mayor or a selected representative, the district chief of Tangbo-Djevie and the chiefs of the 4 villages concerned by the Project: Agbodjedo, Anavie, Djitin Aga and Houeze. The representative of the municipal environmental unit will also be a member of this committee.

In order to ensure the representation of the interests of women and vulnerable groups, a representative of these 2 categories will also be appointed member of each respective committee.

The roles of this committee will be to:

- participate in meetings organized by the Community Relations Service (CRS), during which they will be presented with the progress of the Project, the main environmental and social issues identified and the results of the complaints management mechanism. The frequency of these meetings will vary between monthly and quarterly;
- inform local residents following meetings organized with GDIZ;
- monitor the execution of the works and report any environmental or social problem to the CRS that would require urgent action;
- monitor the development of social project-induced in-migrations to ensure concerted management of accommodation needs, health services, shops, etc. with the promoter and the companies in charge of the works.

### 10.3. Preliminary ESMP

Prior to the start of construction works, several actions will have to be undertaken by GDIZ to secure an access to the site through land acquisition, to develop a relationship with stakeholders and affected populations based on trust, mutual respect and transparency; and to ensure that its contractors will respect its environmental and social commitments.

#### 10.3.1. Human resources management

The first action of the preliminary ESMP will be to adopt and implement human resources policies and procedures appropriate to the Project size and workforce. The main objectives of such policies are presented below.

#### 10.3.1.1. Objectives

During the construction phase, which is expected to last 2 years, a maximum of 1,000 jobs will be created. During the operational phase, the Project could generate around 12,000 direct jobs, depending on estimates based on the volume of jobs generated in other IZs.

Human resources management will therefore be central to the Project and must meet the following objectives:

- Comply with ARISE corporate labour policies listed in § 10.2.1.
- Ensure that recruitment and employment comply with beninese regulations, international labor law (especially 8 ILO conventions and IFC PS 2) and ARISE Fair employment policy and Sexual harassment policy presented in the company ESMS document.
- Establish a local recruitment program that promotes the employment of Project-affected persons and of persons originating from local communities bordering the Project.
- Train recruited workers in all the duties and obligations incumbent on them in terms of environmental protection and respect for local populations.
- Provide them with a mechanism for receiving and managing their complaints and claims.

The procedures detailed below apply to the construction and operation phases of the Project.

#### 10.3.1.2. Local recruitment and content program

The local recruitment program will rest on the following criteria:

- **Priority hiring of persons affected by the Project (PAP)** with equal skills: during the recruitment process, candidates that prove they are PAP of the Project will be given priority access to job openings.
- **Priority hiring of persons from the 8 villages of the study area:** in case where the PAP are not applying for the proposed jobs, the recruiter will focus on hiring persons originating from the 8 villages of the study area.
- **Quota setting for local recruitment:** 50% of the workers must either be PAP or come from these 8 villages (with a margin of 10%). 50% of workers can come from other areas.
- **Quota setting for recruitment among women and vulnerable groups:** it is proposed that a binding quota for the recruitment of women and disabled persons is set up at 5% of the total recruited employees.

The local content program will include:

- set up a **transparent procedure of call for tenders for subcontracting services**, communicated to local companies through the municipality, district (posters, letters, meetings, etc.) or on Project site bill board if any;
- whenever possible (locally available, financially competitive and HSE compliant) **give priority to hiring local subcontractors** coming from Tori-Bossito and Ze municipalities.

In order to encourage the application of the targeted persons and in the same time limit spontaneous migrations:

- The contractor will prohibit recruitment at the gate(s) of the construction site and set up one or several a decentralized recruitment office.

- GDIZ, the contractor and the subcontractors will have to provide the municipalities and the village chiefs with the list of job offers and the required qualifications, as well as the official application form to be filled in by the applicants.
- Leaflets and brochures should be prepared and distributed to the head of villages explaining the recruitment process and local priority recruitment standards. These brochures should be made available to the general public through the municipalities and districts of each municipality as well as to civil society organizations, women's and youth associations.
- The team in charge recruitment at contractor and sub-contractor companies will contact women's and vulnerable groups' associations established in the villages to explain the types of jobs available and encourage them to submit their applications.

The contractor and its sub-contractors will commit themselves to:

- implement the local employment program, particularly of persons affected by expropriation (PAP) with equal skills;
- implement the local content program;
- respect binding quotas set for the recruitment of women and disabled persons.
- carry out broad prior communication on recruitment agendas, recruitment procedures, working conditions, etc. at the village and district levels;
- comply with the labour legislation in force (including ILO conventions).

The contractor will encourage the installation near the construction sites of small temporary businesses (food, water, services, other everyday consumer goods), by setting up a dedicated space, in order to allow mainly women from the villages concerned to benefit directly from sources of income related to the Project in addition to the employment opportunities that must be offered to them.

#### **10.3.1.3. Transparency of the recruitment process**

The recruitment of staff should be carried out with the highest degree of transparency in a collective manner and based on well-defined criteria presented previously. In this context it is proposed to implement the following scheme:

- communication about available jobs and exposure of contractual commitments and measures;
- collection of applications and assessment of workers' skills;
- pre-selection of a list of suitable workers;
- selection of workers, depending on the type of job, either with the communities through a draw (this modality would probably be used for less qualified jobs with many candidates), or with the village authorities and community representatives through a selection committee (composed of village chiefs and community representatives) and on the basis of criteria made public beforehand, or a combination of 2 methods.

The contractor will include in the evaluation criteria of the responses to calls for tenders:

- the geographical location of the subcontractor;
- the transposition of policies on recruitment, health/safety, environmental monitoring, etc.;
- the contractual terms and conditions offered to employees;
- the procedures for monitoring the recruitment process.

#### 10.3.1.4. Workers' training, awareness-raising and code of conduct

Regular **training sessions** of the construction site personnel will be put in place on basic occupational health and safety (OHS) procedures at work including waste and hazardous waste handling and site emergency response plan. The content of training sessions will cover as per IFC standards:

- Knowledge of materials, equipment, and tools
- Known hazards in 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
- Appropriate response to operation extremes, incidents and accidents

For certain type of works (work at height, in confined spaces, truck or heavy engine driving), **specialty OHS training** will be provided to ensure that workers are able to manage the specific hazards of individual work assignments.

Sessions of awareness-raising on the following environmental and social aspects must also be organized:

- natural environment and the protection of biodiversity in their activities;
- preservation of cultural heritage sites and protection of the Anavie sacred forest;
- chance-find procedure for archeological findings during earthworks;
- prohibition of hunting and consumption of bushmeat;
- respect for local customs and practices, particularly in terms of marital relations;
- prostitution and the risk of the spread of STDs and HIV/Aids;
- prohibition of any form of violence against women (sexual harassment, physical violence, etc.);
- prohibition of child work and forced labor;
- prohibition of discrimination against vulnerable persons including persons living with a handicap;
- existence of a complaint management mechanism receiving claims for workers under specific conditions.

OHS training and environmental and social awareness-raising sessions can be organized in the same timeframe. Sessions can be organized daily, weekly or monthly depending on the subject. They can take the form of daily meetings (start-up talks or safety quarter-hours) covering particularly one environmental and social aspect, or monthly briefings. A session will be organized for each new worker entering his position.

A **code of conduct aligned with ARISE corporate Code of conduct (see § 10.2.1)** will be prepared reminding the obligations and prohibitions workers must comply with. Each worker will have to sign the code. A clear sanction system must be defined and workers must be informed about the sanctions they expose themselves to if they breach the code.

Additionally, **internal rules** will be written down by the main contractor applying to its workers. These rules will remind workers on their obligations in terms of discipline and health and safety precautions.

It will clearly state the sanctions to which workers expose themselves if they breach the rules. Rules will be posted on strategic locations of the work site.

#### **10.3.1.5. Respect for worker's rights**

In order to respect the rights of workers, which constitute one of the pillars of human rights at the international level, the promoter and the contractor will develop a Human Resources Management Policy which commits to comply with the various regulations governing labor law in Benin listed in section 3.2.6.2.

The promoter and the contractor will also undertake to respect the 8 fundamental ILO conventions to which Benin is a signatory (cf. § 3.4.1) and in particular:

- No forced labour
- No work for children under 14 (12 for light work)
- Prohibition of most forms of child labour – child under 18 (including hazardous child labour such as work underground, at dangerous heights, confined spaces, with dangerous machinery or tools, in an unhealthy environment exposing to hazardous substances, heat, noise levels or vibrations)
- No discrimination including against women
- Respect for freedom of association and protection of the right to organise collective bargaining
- Equal remuneration

The promoter will ensure that the contractor complies with these agreements by setting up audits. The contractor will in turn ensure that its subcontractors respect beninese labor law and ILO conventions. The promoter may, with the agreement of the contractor, conduct audits of its subcontractors on these topics.

When recruiting, the contractor must provide candidates with clear and understandable information, in their languages and adapted to their level of education, on the terms and conditions of their recruitment. An employment contract must be signed between the 2 parties. The documentation should outline their rights in accordance with national law, including working time and overtime, minimum wages, applicable rotation times, collective and union agreements, and dismissal mechanisms. Any modification in the contractual conditions of the employees must be notified to them.

The contractor must ensure that workers are registered with CNSS so that they have access to health insurance. It should also promote the election of workers' representatives who will represent, through committees, their interests and act as intermediaries between management and workers.

### **10.3.2. Plans and procedures under GDIZ responsibilities**

#### **10.3.2.1. Permits and authorizations in relation with Benin regulation**

Most of the Project activities must be subject to a prior approval and administrative information procedure. The promoter must obtain all the necessary operating permits before (i) carrying out the construction works for the development of the Project and (ii) the commissioning of the infrastructures. Some of these permits are provided against a fee to be paid to the ministry delivering it, the amount of which is set by the said ministry according to the characteristics of the request.

The requested operating permits are:



- Before the construction phase:
  - land clearing (decree N°96-271 of 2 July 1996),
  - groundwater drilling (decree n°2015-578 of 18 November 2015),
- Before the operation phase:
  - wastewater discharges (decree n°2001-109 of 4 April 2001),
  - groundwater withdrawal (decree n°2015-578 of 18 November 2015),
  - waste disposal (decree No. 2003-332 of 27 August 2003).

Before the start of the Project and in line with the article 45 of the Decree No. 2017-332 of 6 July 2017, the promoter shall also communicate to ABE its detailed program for carrying out the activities of the ESMP and the RAP in accordance with the work schedule. Moreover, at the end of the monitoring period (construction phase), GDIZ will send to ABE an environmental monitoring completion report which may, depending on the respect of the implementation of the ESMP, issue an environmental monitoring release.

### 10.3.2.2. Additionnal studies / actions

#### 10.3.2.2.1. Under GDIZ's responsibilities

In order to properly assess impacts on water quality, and indirectly, on the natural environment and the health of local communities, further technical studies have **to be conducted by the promoter** that will clearly define the technical processes, their related inputs/outputs and propose appropriate mitigation measures.

Indeed, the present ESIA has underlined that additional data were needed before being able to assess several impacts with precision such as: significant risk of pollution and flooding due to central drain water discharges and disturbance of surface runoff, water resource consumption and conflicts on water uses. These deficiencies are mainly related to the lack of knowledge on the design and management of infrastructures for the water supply, water treatment and drainage networks.

Hence, different studies have to be conducted and are about:

#### **Flooding risks – hydraulic study**

Although GDIZ will not significantly disturb the natural hydraulic scheme of the area, it is commonly acknowledged that land use changes associated to land take and soil sealing, along with other drivers such as climate change and poor, unregulated land management, may increase flood risks.

To characterize the effects of soil sealing due to GDIZ land take, a **hydraulic study** should be performed and should provide:

- An estimate of the new surface runoff volume (versus the current runoff volume).
- The new soil infiltration capacity and impact on the aquifer resources.
- The sizing of the drainage network (detention volume to compensate soil sealing) and the hypothesis used, including the return period and frequency of storm.
- The proposed design concept to reduce runoff volume and favour ground infiltration.
- The design of the central drain, **including the part downstream GDIZ**, and its management.

### **Water supply – hydrogeological study**

The Project water needs are high and will be satisfied by groundwater reserves. The assessment of the water resources of a region, or the efficient design of a water supply network for a Project, requires an adequate compilation and an assessment of reliable hydrological data.

Key to sustainable exploitation of any aquifer is a full understanding of its recharge, storage and through-flow characteristics and how these vary on a seasonal and multi-annual basis. Consequently, a **hydrogeological study**, including a resource modelling for the operational phase, has to be conducted and should provide:

- Delineation of the aquifer geometry, its thickness, its parameters (porosity, hydraulic conductivity, transmissivity, storativity, leakage factor).
- Groundwater recharge (modality and volume) and its variation throughout the year.
- Chemical composition of groundwater.
- The current pressure on the aquifer and the uses already observed.
- Distribution of boreholes to limit interference (aquifer drawdown) and know aquifer variation level (radius of influence of pumping).
- Pumping tests in new or existing boreholes.
- **A resource modelling and its long-term availability with the expected GDIZ uses.**

Key types of data required for the study include the following:

- (a) Biophysical data – topography, soils, geology and vegetation – required for modelling and to set the environmental constraints.
- (b) Hydrometeorological data – characteristics of climate, surface water and groundwater – required to define the available resource characteristics.
- (c) Socio-economic data – land use and demography – required for understanding the water needs.
- (d) Water-use data – required to complete the picture of supply–demand.

### **Environmental & risk impact assessment**

To date, few data on the wastewater treatment plants are available, because the technical studies on these plants are on progress and because the future industrial processes are still unknown. As the inputs/outputs of a wastewater treatment plant are tied to the type of treatment which is itself heavily dependant on the industrial process and its effluents, it is difficult at this stage of the Project to properly assess the impact of an industrial process whose main characteristics are not yet available.

Before the construction of the wastewater treatment plants (6 are expected), an **environmental and social impact assessment for the expected 6 treatment plants** should be conducted and address the following points:

- Conceptual design of each treatment plant including the sizing hypothesis, the description of the physical and/or biological units, sludge management and discharges points.
- Effluents quality requirements from the industrial units.
- Expected quality of the treated effluents discharge in the environment (central drain, if its still the case) and the capacity of the environment to “dilute” these discharges.
- Expected sludge management.

- Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector, especially the one for Water and sanitation.

Same is required **for the waste transfer stations**, except the application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector to be used: waste facilities.

As required by the beninese regulation, an **environmental impact assessment for the boreholes drilling** must also be conducted. Note this EIA constitute an essential prerequisite to obtain the operating permit for groundwater withdrawal (cf. section Annex IX).

A hazard study (preliminary risk assessment / hazard identification, reduction of potential hazard, accident scenarios and consequences analysis, dominos effects) including the definition of appropriate safety measures must be conducted for the GDIZ infrastructures, specially:

- CETP and STP;
- electrical substation;
- waste transfer stations and compost trenches.

For all installations whose hazardous phenomena have effects outside the site, a detailed risk assessment will be carried out. Bow-tie (integrating fault tree and event tree) will be used for determining the probability of each residual dangerous phenomenon.

→ **in order to take into account the additionnal measures which will be defined in the technical studies, hazard studies and ESIAs, they should be integrated in the environmental and social management plan of GDIZ or of the main contractor, depending on the entity responsible for implementation. Therefore, GDIZ will be required to update both ESMP in order to reflect the functioning of the projected infrastructures and associated impacts.**

#### **Waste management**

**Identify recognized Beninese companies** in order to regularly collect and treat recyclable and specific waste (hazardous). Local partnership should be considered.

#### **10.3.2.2.2. Outside of GDIZ responsibility but with its cooperation and/or endorsement**

#### **ESIA for waste landfill (existing or to be created)**

The disposal of waste produced by GDIZ is expected to be managed by the government, except the biodegradable waste that will be gathered and disposed on site, in the compost units (2 are anticipated). The non-biodegradable waste will be sent to a landfill that the Government must develop in close vicinity of the Project site or to an existing landfill site that will need to be expanded. In both cases, an **environmental and social impact assessment for the new or expanded landfill** will have to be performed to well manage the associated impacts.

#### **Design of the stormwater management system for the broader area including airport and Glo-Djigbe development area**

The question of the **stormwater management has to be considered at a larger scale** than that of the Project, because the whole area is being developed as an airport as well as a the Glo-Djigbe industrial development by the Government of Benin. As the overall land management is under the Government responsibility, they must plan for greater level storm water management. **GDIZ shall notify those points to the government administration** so that they take all necessary measures to ensure efficient drainage of the area.

#### **Definition of the environmental and social specifications for the future GDIZs' industrials**

As for the main contractor and the promoter, the future industrials will also be responsible for preparing studies relating to their activities and processes, as well as the respect and the implementation of the “E&S specifications for the operation of the GDIZ industrial plots”. All of these must be part of their contract.

The promoter will be responsible to define and develop objectives and procedures that the future industrials will have to respect, as well as communicate the specific needs regarding technical studies the industrials will have to provide.

Please refer to section 10.5.2 for more details.

### 10.3.2.3. Preparation of the HSES specifications

The promoter will include in the tender documents the specifications defining environmental and social obligations (HSES specifications) that are imposed by the promoter on the main contractor and also on its subcontractors. These requirements will be incorporated into an annex document called “HSES Specifications”. This document will define the objectives and measures that the companies hired for the construction will have to implement in order to comply with the conclusions / measures of the ESIA and the terms of this ESMP.

These specifications will come directly from the ESMP in construction phase presented in the § 1.1.

The clauses are specific to areas where the main contractor will be involved, i.e. GDIZ area; work area (storage area, work office, etc), base camp and main roads taken. It lays down particular minimum requirements to be applied by the main contractor and its subcontractors regarding the E&S management. The contractor (s) will be responsible for ensuring that all its subcontractors comply with the requirements set out here.

### 10.3.2.4. Communication and engagement plan with stakeholders

#### 10.3.2.4.1. General objectives

The smooth running of a Project will essentially depend on communication, i.e. the ability of those responsible to disseminate transparent information about the Project while ensuring that it has been understood by all stakeholders and, first and foremost, by the populations affected by the Project.

Indeed, the overall finding is that in most cases, information on projects is communicated to them only at the time of implementation. The persons mobilized then find themselves forced to act in an emergency without having the time to consult the interested parties in turn. The causes of these problems can be multiple: complexity of communication channels and the decision-making chain, lack of staff dedicated to communication and dialogue at the promoter level, failure to take into account the costs of disseminating information, etc. The problems can also be caused by the lack of a clear understanding of the Project's objectives. For all these reasons, the communication chain must be clear and based on solid commitments and means. It must be structured around 2 elements:

- A **Corporate Communication Plan**, which frames the Project's communication strategy (target, content, means and resources) covering broad themes relating to institutional communication, also known as corporate communication, and internal and external communication on the Project as a whole.
- A **Stakeholder Engagement Plan (SEP)** that identifies priority stakeholders with whom regular dialogue should be established.

#### 10.3.2.4.2. Standard content of a Corporate Communication Plan

A communication plan is a document that presents the strategy that the promoter will put in place to communicate about his Project in order to improve the level of knowledge, the positive perception and therefore the interest that the stakeholders have for it.

The communication plan goes beyond the stakeholder engagement plan because it includes considerations of internal communication (information to employees and workers) and external (information to authorities, investors, shareholders, populations living near the Project, NGOs). It also has marketing aims.

#### 10.3.2.4.3. Content of the Stakeholder Engagement Plan

As part of the environmental and social impact assessment carried out for the Project, a Stakeholder Engagement Plan was developed (see Annex II).

The main purpose of a SEP is to assist the promoter in managing and facilitating its engagement with stakeholders affected by the Project throughout the different stages of the Project life cycle, from Project preparation and construction to commissioning. It should help to create an atmosphere of understanding by actively involving those affected by the Project and other stakeholders, and by providing these groups with sufficient opportunity to express their views and concerns about the Project.

It should also guide the procedures for handling complaints and grievances from individuals living in the Project area. A SEP is therefore much more specific than a communication plan, as it focuses on the persons and stakeholders affected (positively or negatively) by the Project.

The SEP developed for the Project focuses on the stakeholders concerned by the ESIA and in particular the users of the Project site perimeter, i.e. the populations of the 8 villages:

- Dokanme, Gbetaga, Sogbe and Zebe in that of Tori-Bossito.
- Agbodjedo, Anavie, Djitin-Aga and Houeze in the municipality of Ze.

The SEP is a useful tool for managing communications between the promoter and stakeholders. It is a dynamic document where engagement and communication actions will need to be reviewed and updated based on the results obtained during the implementation of the various activities of the plan and the priorities and important events in the life of the Project.

#### 10.3.2.4.4. Organization and missions

Most of the localities impacted by the Project are landlocked and do not necessarily have access to the mobile network. The flow of information between the different administrative levels and all the actors is therefore difficult. As with most Projects of this type, it is highly recommended to set up during the preparation phase a **team responsible for managing community relations and resolving complaints**, responsible for being the transmission belt of the information between local actors and towards the populations affected by the Project.

It is therefore suggested that GDIZ set up a specific Community Relations Service (CRS) directly attached to the Environmental and Social Department (ESD).

The CRS, in conjunction with the other services and subcontractors, may in particular:

- ensure the organization and harmonization of communications relating to the Project;
- set up the various tools necessary for monitoring the Project: database, online agenda and directory, online Project monitoring book, consultation register;

- develop the media necessary for the dissemination of information and the participation of stakeholders: questionnaires, brochures, posters, monitoring tools and interview grids, etc.;
- coordinate and supervise the different modes of communication: radio, newspapers;
- capitalize and pool all the information relating to the implementation and monitoring of the ESMP.

In addition, their continuous presence will allow:

- building a bond of trust with the village authorities and the persons affected by the Project;
- ensuring continuous communication between the communities, the districts, the municipalities and the Atlantic department during the RAP implementation phase;
- coordinating the intervention of subcontractors with stakeholders (training, awareness, meeting).

The SRC team will also be able to count on the local presence of:

- 8 village facilitators living in each of the 8 villages of the study area;
- 2 focal points in the municipalities of Ze and Tori-Bossito.

#### **10.3.2.5. Grievance management mechanism**

It is planned to develop a grievance management mechanism that will enable the entire population affected by possible nuisances resulting from construction activities or by Project land acquisition to raise the problems encountered to the Project management.

The mechanism, developed in the Project's SEP, will have to comply with the following international requirements and good practices. Its functioning scheme is presented below.



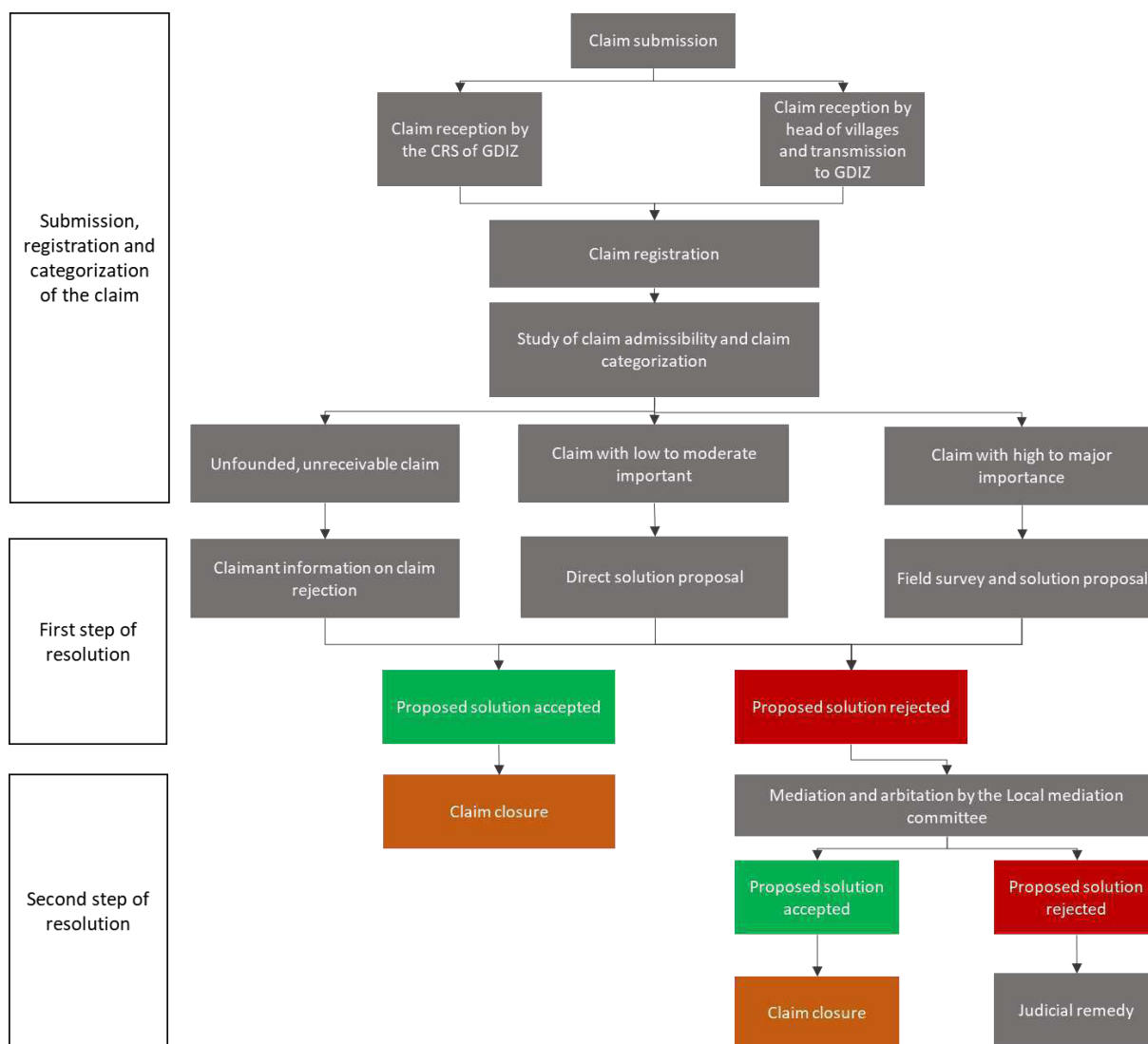


Figure 114 : Grievance management mechanism

### 10.3.2.6. Resettlement action plan (RAP)

#### 10.3.2.6.1. Objectives

The Project will lead to a loss of land ownership that will affect all those who own or use the land, which will result in:

- a loss of housing leading to the physical displacement and relocation of those affected;
- a loss of cultivated agricultural land, leading to a decrease or even disappearance of farmers' incomes;
- a loss of pineapple fields labeled Sugar Loaf, the production of which is used to supply the pineapple sales and processing chain.

A resettlement action plan (RAP) will have to be prepared to mitigate these impacts. It will have to manage the physical and economic displacement of persons with goods and economic activities on the Project site.

At a preliminary stage, it is estimated that nearly 3,000 people could be affected by the Project (based on observations made on the number of persons identified for the Glo-Djigbe airport project).

#### 10.3.2.6.2. Procedure for expropriation due to public utility

The Republic of Benin, after the promulgation of a Declaration of Public Utility (DUP) on 15 January 2020, will take over the steering and implementation of the expropriation procedure in collaboration with the promoter, in accordance with the Land and State Code.

The procedure will follow several major steps as outlined in the table below.

**Table 50 : Operational phases of the ordinary procedure for expropriation for public utility purposes**

Phases	Steps	Responsibles
Preliminary phase	<ul style="list-style-type: none"> <li>Existence of a project of public utility, of local or national interest</li> <li>Identification of the site where the project will be located</li> <li>Carrying out studies (topographical, environmental and social, etc.)</li> </ul>	Carrying structure of the Project
Administrative phase	<ul style="list-style-type: none"> <li>Taking of the Declarative Act of Public Utility (DUP) which can be either an order (Mayor or Prefect), a decree (President of the Republic) or a law (National Assembly) depending on whether the project is local, regional or national in nature. It specifies the site of the project and the deadline for the expropriation process (12 months).</li> <li>Taking of the order to set up the Commode and Incommode Commission of investigation presided by the MEF or the Mayor or their representative es-qualities as the case may be</li> <li>Organization and conduct of the investigation of commode and incommode</li> <li>Filing and posting of the provisional general plan of the properties affected for one month</li> <li>Publication of the report at the end of the investigation through all channels and notifications to those affected by the project</li> <li>Issuance of the order to set up the Interministerial Commission in charge of compensation and expropriation.</li> <li>Conducting a Land and Property Survey by a consultant (if required) and development of the Resettlement Action Plan if required</li> <li>Validation and adoption of the EFI and RAP report</li> <li>Adoption of the decree of transferability, publication in the OJ and notification to the parties concerned; maximum period of 6 months after the adoption of the DUP</li> </ul>	<p>National Assembly, PR, Ministers, Prefect or Mayor</p> <p>MEF/City Hall</p> <p>Commission of Inquiry of commode and incommode</p> <p>MEF/ANDF</p> <p>Inter-ministerial Commission</p> <p>Inter-ministerial Commission</p>

Phases	Steps	Responsibles
		MEF/City Hall
Judicial phase	<ul style="list-style-type: none"> <li>Approval of the amounts of compensation for damages by the competent court of justice</li> <li>Negotiation with those affected by the project (PAP) and signing of the PV of agreements</li> <li>Payment of compensation awards to FAPs</li> <li>Issuance by the competent CFI of the order to release the estate and make it available to the expropriating authority</li> <li>Legal security of the estate (creation of the land title of the Beninese State)</li> </ul>	CFI and Inter-ministerial Commission  Inter-ministerial Commission   CFI   ANDF

Source: ANDF

Within this framework, the Ministry of Economy and Finance and the ANDF will take an order to set up the Interministerial Commission for Compensation and Expropriation. This commission will be responsible for:

- carrying out or having carried out by a consultant a Land and Property Survey (LPS) and a Resettlement Action Plan (RAP);
- validating and adopting the LPS and the RAP report.

Following this, the administrative procedure will follow its course with:

- the approval of the compensation amounts by the competent court;
- negotiation with the affected persons and the signing of the PV of agreements;
- the payment of compensation to the PAPs, the order for the release of the domain and its handing over to the expropriating authority;
- the legal security of the estate through the creation of the land title of the Beninese State.

#### 10.3.2.6.3. Achievement of the RAP

The implementation of the RAP has been entrusted to a consultancy firm with expertise in the field and able to demonstrate successful experience in conducting RAPs covering more than 2,000 persons.

The RAP will have to comply with IFC standards and follow the plan proposed by the World Bank in its new 2017 environmental and social standards. This plan and its detailed contents are presented in Annex XV.

It should include the following compensation measures:

- direct compensation to land owners holding a Land Title and presumed owners (i.e. those who do not hold a Land Title but who can demonstrate customary ownership of the land according to the Land and State Code);

- direct compensation of land operators (under contract with the owners) and other users who are not owners of the land they use or occupy, such as tenants or guardians;
- establishment of a re-housing program for households losing their main residence which offers them the opportunity to relocate to an identified re-housing site and rebuild their homes;
- implementation of a livelihood restoration strategy for households losing their income from agriculture. This strategy will propose several support programs for the persons affected: agricultural training, assistance with vocational training (trade, crafts, business management, etc.);
- priority recruitment of persons affected by expropriation, with equal skills, for jobs created on the construction site in order to offer them a new source of income;
- support program for the pineapple sector with the "Sugar Loaf" label in 2017: ARISE will have to design a special support program for this sector. For example, the company could consider giving free access to one or more batches on its site so that local stakeholders in the sector in the municipalities of Tori-Bossito and Ze can set up pineapple processing units (pineapple juice, dried pineapple, canned pineapple, pineapple syrup, etc.) for export.

Compensation measures will have to be primarily in nature, i.e. by recovering agricultural land available to farmers and rebuilding the houses of households that have lost their homes. The PAPs will also need assistance during the transition period in the form of additional compensation to the compensation.

Women and vulnerable groups will need specific support measures, including the following:

- measures to identify and compensate women owners or operators in the process of identifying affected persons and property;
- measures to assist households with vulnerable persons, such as special compensation and assistance with relocation.

#### **10.3.2.6.4. Monitoring indicators**

The follow - up indicators are:

- RAP study completion stage;
- number of persons compensated by impact categories;
- number of partners for RAP implementation recruited;
- % disbursement of the RAP implementation budget.

#### **10.3.2.6.5. Responsibilities for implementation and monitoring**

Responsibility for implementation and monitoring is joint between the Republic of Benin, via the Compensation Commission, and the promoter GDIZ.

#### **10.3.2.6.6. Timeline**

This plan will have to be developed and partially implemented prior to the start of the works on site.

### **10.3.2.7. Cultural heritage management plan**

#### **10.3.2.7.1. Objectives**

The Beninese people is deeply engaged into the practice of African religions, especially the Voodoo cult which rests on a complex network of deities and rituals performed on sacred sites which can be altars, trees or sacred forests. Sacred forests are doubly important. First, they house fetishes and voodoo rituals. Second, following the massive deforestation that occurred in the country, they constitute relics of the primary forest.

Elements of Voodoo cultural heritage (both used by individual and the community) are implanted on the Project site according to interviews with the impacted communities. Thus, a sacred forest is located within the Project site's right-of-way: the sacred forest belonging to the village of Anavie. This forest shelter deities and is used to perform Voodoo rituals. Besides, certain deities are located in farmers' agricultural fields to protect them. These cultural elements are subject to rites and sacrifices in the same way as other deities in the area. They have to be protected or respected in the framework of the Project.

#### 10.3.2.7.2. Measures

During the first ESIA implemented to the Beninese environmental standards and validated by the ABE, the presence of the sacred forest of Anavie was identified as a major issue for the Project. Indeed, sacred forests in Benin are important for local communities and must be protected from any kind of aggression or degradation.

The promoter therefore decided to integrate the preservation of this forest into its management plan. This forest is located on the map below, encircled in red.



(Source: ARISE, 2020)

**Figure 115 : Location of Anavie forest in the general plan of the Project site**

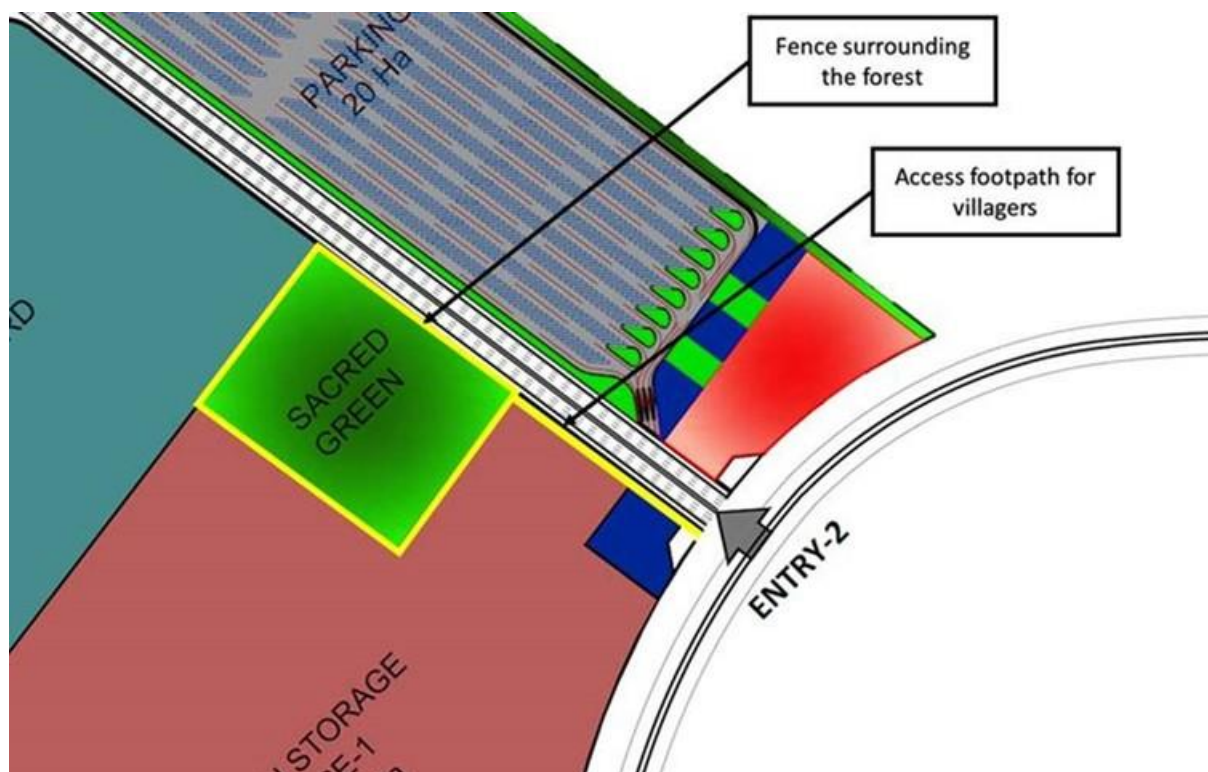
For the purpose of upgrading the ESIA to IFC standards, the Consultant conducted a dedicated interview with the Anavie head of village and traditional leaders in August 2020 in order to assess if the solution proposed in the national ESIA was suitable for them. This interview, whose minutes are presented in Annex XVI, shows that this measure is not suitable for local communities which require that the forest is excluded from the Project footprint completely and permanently.

In order to find a compromise that would be suitable for all parties, it is proposed that the following measures are implemented by GDIZ in the preparation phase:

- GDIZ should revise the Project design to exclude the forest from the projet footprint;

- if not technically feasible, GDIZ should commit to preserve the forest as it is and integrate it fully into the Project design respecting the recommendations below:
  - Fence off the forest (with green hedges) with a buffer zone (20 meters width) and include in the design a small pathway for the villagers (2 to 3 meters large) located along the road at Entry-2 so that they can have a direct access from the outside of the site.
  - Do not store any material, waste or other material close to the forest.

A small sketch of the possible access road is presented below in bright yellow.



(Source: ARISE, 2020)

**Figure 116 : Possible access to sacred forest if exclusion from Project design cannot be achieved**

The final design of the Project will have to demonstrate clearly how it intends to deal with the sacred forest and to maintain a permanent access for villagers. This solution will have to be presented to Anavie leaders and approved by them.

Before starting the construction works, GDIZ will have to organize all the rituals and ceremonies required by traditional authorities and religious leaders in order to comply with local cultural practices. The list of rituals to be performed will be provided by the head of village of Anavie to the promoter prior to the start of the works.

The contractor will receive a notification to start the work from GDIZ only after all the ceremonies have been conducted and construction works start is approved by leaders of Anavie village.

#### **10.3.2.7.3. Monitoring indicators**

The monitoring indicators are:

- number of ceremonies to relocate sacred sites carried out;
- number of complaints lodged in relation to cultural heritage sites.



#### 10.3.2.8. Community development plan

As a voluntary contribution to the community development of the 8 villages affected by the Project, the promoter could set up a Community development fund which could be provided with an amount of 140 MFCFA, i.e. 17.5 MFCFA per village, in order to finance development projects that the populations wish to see carried out as a priority in their villages. This amount is subject to the promoter's choice in line with its corporate CSR strategy.

The public consultations and focus groups organized as part of this ESIA showed that the priority needs expressed by the local residents were:

- provision of access to electricity;
- construction of water access infrastructures (especially in Tori-Cada villages);
- construction of health centers;
- construction or renovation of roads and highways;
- construction of markets;
- construction of youth centers;
- construction of sports fields;
- construction of additional schools or classrooms.

However, these needs might not reflect the reality on the ground due to a lack of knowledge/education of persons who expressed these needs, neither take into account the planned projects of the Tori-Bossito and Ze municipalities in their PDCs (as underlined, each municipality has a set of programs for 2020 forward presented in the § 6.5.1.4 and 6.5.1.5) or could be instrumentalized by certain groups for their own benefits.

Therefore, prior to start disbursing the budget, it is recommended that GDIZ perform a **study on the Community development needs** using extensively the PDC of each municipality as a source of information. This study should take into account population growth and increased pressure on public services and infrastructure due to project-induced in-migrations. The results of the study will be a detailed **Community development plan** proposing how and in which sector to allocate the development fund.

This plan will also make propositions to help GDIZ to:

- Choose which approach it wants to use to implement its plan:
  - Direct management of the community development budget by the E&S Department Team.
  - Creation of a foundation to manage the budget.
  - Partnership with a renowned NGO.
- Determine if it wants to support 2 to 3 strategic orientations or fund a broader range of projects without setting priority.
- Determine on which duration the funds are to be disbursed (over the construction period or over the operation period).
- Decide how the projects are selected: for exemple, each village proposes to the promoter one or more projects that it wishes to see carried out within the allocated budget envelope and the strategic orientations presented; or GDIZ choose which projects to fund in agreement with municipal authorities.

In order to develop its community development plan organisation, GDIZ can rely on the following publication: IFC (2015), *Establishing foundations to deliver community investment*. This key document provides guidances on how to set up community investment in a structured and coherent way with the company business lines.

### 10.3.2.9. Revegetation program

#### 10.3.2.9.1. Program content

Due to the low ecological value of natural habitats in the Project area, residual impacts are not significant thus no compensation programs, usually designated as Biodiversity Action Plans (or BAP) by IFC PS 6, are expected. Besides, GDIZ already plan to develop green spaces where native large canopy trees will be planted with native flowering plants and ornamental trees along the road and in the green pockets of the site. These green spaces will cover an area much greater than the initial natural vegetation area (150 ha against 11,7 ha), which will automatically offset the loss of vegetation. Besides, it is proposed to develop a green belt surrounding the site to increase revegetation surfaces but also to satisfy other purposes (cf. section below).

Guidelines for the set-up of the revegetation program are presented below.

#### Measures to respect local biodiversity context

GDIZ has to be in line with the following measures in order to develop green spaces that respect the local ecological and biodiversity context:

- **Create**, before the clearing operations, a **plant nursery** for the species and plants which can be used during the revegetation of the work areas, camp site (see section 10.3.3.2) and the development of the GDIZ green spaces. The installation of nurseries **generally begins in February to have operational plants for the rainy season that follows**. Appropriate ordering shall be placed early to obtain the plants at the requested time which is early in June, to be planted at the beginning of the rainy season. Alternatively, it is possible to **purchase the plants to an existing nursery, but the order must be processed early in February** (to have operational plants for the rainy season).
- **Select indigenous and native flowering plants and ornamental trees** to be planted in the nursery. The ecology of ornamental trees proposed by GDIZ does not match with the local environmental conditions. For example, *Anogeissus leiocarpa* is distributed from the center to the north of the country. The selection has to be based on the climatic and stationary conditions of the environment. Species to be considered can be the following:
  - Benin Mahogany (*Khaya grandifoliola*)
  - Black tamarind (*Dialium guineense*)
  - Ebony (*Diospyros ebenum*)
  - Shea nut (*Vitellaria paradoxa*)
  - *Terminalia Mantaly*
  - Neem (*Azadirachta indica*)
  - Silver Oak Tree (*Grevillea robusta*)

For the tree species that are endangered on the Benin Red List (3 species *Khaya senegalensis*, *Milicia excelsa*, *Triplochiton scleroxylon*), the same species should be planted in the same amount that those that will have to be cut (according to Benin Law n°93-009 of July 2, 1993 on the forestry regime in the Republic of Benin).

- Plan to plant sufficient seedlings or to place an order to the nursery for 150 ha of green spaces and 11 ha of green belt. The possible plants mortality must be taken in account in the purchase of the number of the necessary seeds /seedlings.

#### **Forestry expert assistance**

In order to set up these measures, **GDIZ will have to contract a forestry expert** whose role will be to support GDIZ to:

- Identify the main trees, shrub and plants species in the relictual zones of natural vegetation not covered by the flora field survey (cf. § 6.1.2.2) before clearing activities in order to **update the flora census of the GDIZ area** and to develop one for the work area and base camp. This will confirm the content of the revegetation program in terms of species and will help to select indigenous and native flowering plants and ornamental trees adapted to the environmental conditions of the area.
- Take care of the **tree felling authorization process** to be conducted with the Directorate General of Water, Forests and Hunting in application of Law No. 93-009 of July 2, 1993 on the forestry regime in the Republic of Benin. To do so, the forestry expert will:
  - Conduct an inventory of the trees that need to be cut in order to fill in the felling request specifying the name / species and the number of stems to be cut, the geographical location, the mode of acquisition of the trees and the reason for felling to the secretariat of the Head of Forest Inspection.
  - For tree species on Benin Red List that are endangered (3 species mentioned previously), provide in the felling request the reasons why the species cannot be preserved on the site and propose mitigation measures such as the site identified for compensatory reforestation, the number of individuals to be replanted as well as the planned monitoring.
  - Assist GDIZ in submitting the request and answering to any request for clarification.
- Identify one or several appropriate **nurserymen** able to provide the selected seeds and/or seedling and place an order for these ones. As seeds and seedling will be used for the GDIZ green spaces, but also the revegetation of work area and base camp, seeds and seedling could be native species collected on-site before the land clearing. If no nurseries are available, the **forestry expert could be mandated to set up a nursery for the Project**.

In the case where the forestry expert is mandated to set up a nursery for the Project, he will:

- Provide its **knowledge and know-how to take care of the nursery**, develop the seedlings / seeds and ensure an effective transplanting. The plants produced for these species will be transplanted during the rainy season (early in June) in previously identified areas and then regularly watered during the following dry season. The number of seeds/ seedlings should be determined in taken into account the plants survival rate. It is recommended to plant seedlings of about 40 cm.
- Install a **rational irrigation system** (with ducts filled with water and humus, for example) for the nursery plant, supervise the **planting process** and **monitor plant growth to detect anomalies and take corrective actions**.

#### **Green belt development**

Moreover, aiming to an increase of **the Project environmental performance**, it is proposed to develop an **additional reforestation program** in the form of a **green belt of 11 ha** to be created around the GDIZ.

The implementation of a green belt indeed brings several advantages:

- Ensure a **proper landscape integration**.
- Plays the role of a **natural noise barrier**.
- Enable the **free displacements of the little fauna** and provide new **nesting habitats** for the avifauna.
- And does not require the acquisition of additional lands to develop this reforestation program.

The green belt is proposed to be developed all around the GDIZ, 22 km-long on 5 meters-wide and involves the plantation of 11,000 plants of tree species (4 meters between 2 plants on 2 lines spacing of 3 meters). This green belt may be planted with the above tree species and other lower species, if possible. If necessary, punctual clearing is done after to allow trees to grow in diameter.

The estimated budget is as follow, on the hypothesis based on the purchase of plants directly to a nursery.

**Table 51 : Budget for a green belt**

Activity	Quantity	Unit	Unit price (FCFA)	Cost (FCFA)
Delimitation by the surveyor	22010	ml	300	6,603,000
Soil preparation	11	ha	95000	1,045,000
Purchase of stakes and transport	11006	picket	30	330,180
Picketing	11	ha	50000	550,000
Purchase of plants and transport	11006	plant	150	1,650,900
Pitting	11006	unit	25	275,150
Planting (distribution of seedlings and planting)	11006	plant	50	550,300
First passage plant care	11	ha	40000	440,000
Second passage plant care	11	ha	40000	440,000
Third passage plant care	11	ha	40000	440,000
Fourth passage plant care	11	ha	40000	440,000
Replenishment at the rate of 20% missing (Purchase plants, transport and planting)	2202	plants	200	440,400
Monitoring and protection of the plantation against fires and cattle wandering	11006	plants	200	2,201,200
<b>TOTAL</b>				<b>15,406,130</b>

It is necessary to add some budget for the recruitment of the forestry expert in charge of these activities and the associated reporting. This represent usually around 20% of the cost above.

#### 10.3.2.9.2. Monitoring indicators

The monitoring indicators are:

- number of seeds / seedlings planted versus the total number to be transplanted,
- number of dead seedlings.

#### 10.3.2.9.3. Timeline

This plan applies to the whole Project but shall be launched during the preparation phase.

### 10.3.3. Environmental and social specifications for the main contractor and its subcontractor

#### 10.3.3.1. Detailed ESMP for the main contractor

This document will be prepared by the main contractor as soon as the contract is signed and validated by the promoter and will fully meet the requirements set out in the tender documents, **specially the HSES specifications**, but also the GDIZ ESMS and the procedures describe below.

This construction ESMP will be applied for all main contractor's activities and work areas.

The main contractor will propose the E&S organisation that will enable him to develop, implement and monitor the ESMP procedures and HSES specifications and perform the E&S site visit and the related reporting for all the period of the construction phase, as developed in section 10.7. This ESMP may be revised in order to adapt or improve the procedures and technical measures to improve their efficiency (audit, site visit, etc).

The following general structure should be applied to each ESMP procedure:

- Scope of procedure: outline the purpose of the procedure.
- Regulation and planification framework: identify all applicable laws and regulation, objectives, performance indicators and related documents that should be considered.
- Procedure details: outlines the mitigation measures proposed by the procedure, with appropriate details enabling to properly ensure its implementation and monitoring.
- Implementation framework: define all responsibilities for its implementation, monitoring and review.

ESMP procedures will be supplemented by specific action plans if necessary, the final list of which will be detailed in the tender documents and a list of which is presented below based on the conclusions of the ESIA and on the progress of the Project. The following procedures will be requested by the promoter from the main contractor for the construction phase:

- Biodiversity management plan
- Air emission and noise management plan
- Erosion and soil quality management plan
- Waste management plan
- Hazardous product management plan
- Water resource and discharges management plan
- Culturage heritage management plan
- Occupational Hygiene, Health and Safety Plan
- Traffic and road safety management plan
- Community health and safety management plan, including Security personnel management
- Stakeholder engagement, aligned with the responsibilities attributed to contractor in the SEP

- Grievance mechanism, in compliance with existing mechanism in the SEP
- Recruitment and human resources management, including workers awareness

#### 10.3.3.2. Provisions for organisation of work area and base camp for the main contractor

All works must be subject to a prior approval and administrative information procedure. Before starting the work, the main contractor must obtain all the necessary operating permits to carry out the work area / base camp for the Project. The requested operating permits are:

- Before construction phase:
  - land clearing (decree N°96-271 of 2 July 1996),
- Before operation phase:
  - wastewater discharges (decree n°2001-109 of 4 April 2001),
  - waste disposal (decree No. 2003-332 of 27 August 2003).

The main contractor shall select a place for its work area / base camp in line with E&S specifications to minimize its environmental footprint and rehabilitate the areas at the end of the Project, as described below.

Design measures and procedures must be implemented to limit the usage and alteration of soils and vegetation. These measures represent a prevailing criterion in selecting the location and layout of work area and base camp in order to limit their human and natural environmental impacts. These criteria involve:

- Soil. The following points must be considered:
  - Preferentially locate work areas and base camp on flat areas to reduce topographical alterations. If necessary, it is preferable to opt for earthworks in steps to minimise soil excavation.
  - Locate work areas and base camp as close as possible to the GDIZ areas, while seeking to minimise, whenever possible, their distance from existing roads. This will affect fewer inhabitants and will tend to reduce the sector affected by an access road.
  - Ensure rehabilitation of all affected area at the end of the works. A **rehabilitation program should be provided, including measure for an appropriate revegetation.**
- Water. Preferentially locate engine washing areas, hazardous products storage area and waste storage area away from local borehole in order to limit the risk of accidental contamination.
- Vegetation. The following points must be respected:
  - Minimise bush clearing areas by maximising usage of existing cleared areas for constructing tracks, work area and base camp.
  - Draw up a procedure for bush clearing, which includes the following aspects: bush clearing/brush cutting only if necessary and limited to a minimum, no felling of trees with diameters exceeding 10 cm and preferred brush cutting method (manual brush cutting).



## 10.4. ESMP in construction phase

The various plan proposed in the construction phase aim at gathering and presenting for each topic the mitigation measures, the responsibilities for their implementation and the monitoring requirements.

### 10.4.1. Biodiversity management plan

#### 10.4.1.1. Objectives

The physical presence of GDIZ will result in the destruction of the biodiversity initially present on the site. The activities that have a direct impact on biodiversity can be summarized as follows:

- cutting of vegetation,
- clearing and de-vegetation,
- excavation of surface soil layers and earthworks on the site.

These impacts will be of moderate importance, especially as the Project site has little natural vegetation (consisting of open and semi-deciduous dense forests), being mainly planted with mosaics of crops and fallow land dotted with a few trees.

The main contractor will have to develop a **biodiversity management plan**, whose objectives will be to limit damages to the natural environment during the works and prevent invasive species spread because of the Project. The contractor will explain how it intends to implement these measures and through which material means.

##### 10.4.1.1.1. Measures to preserve biodiversity

Although plant biodiversity is relatively low on the site, the activities that will lead to the destruction of the flora will have to be supervised to avoid unnecessary destruction and to restore the natural environment on the site and in its immediate surroundings as much as possible:

Regarding clearing operations:

- Limit clearing activities and more generally the works easement to the strict necessary and clearly mark the rights-of-way.
- Exclude the sacred forest by fencing in order to preserve it. The fence will be installed definitely around the forest during the construction phase. This measure allows keeping the sacred character of the forest highly important for surrounding villages (cf. § 10.4.7).

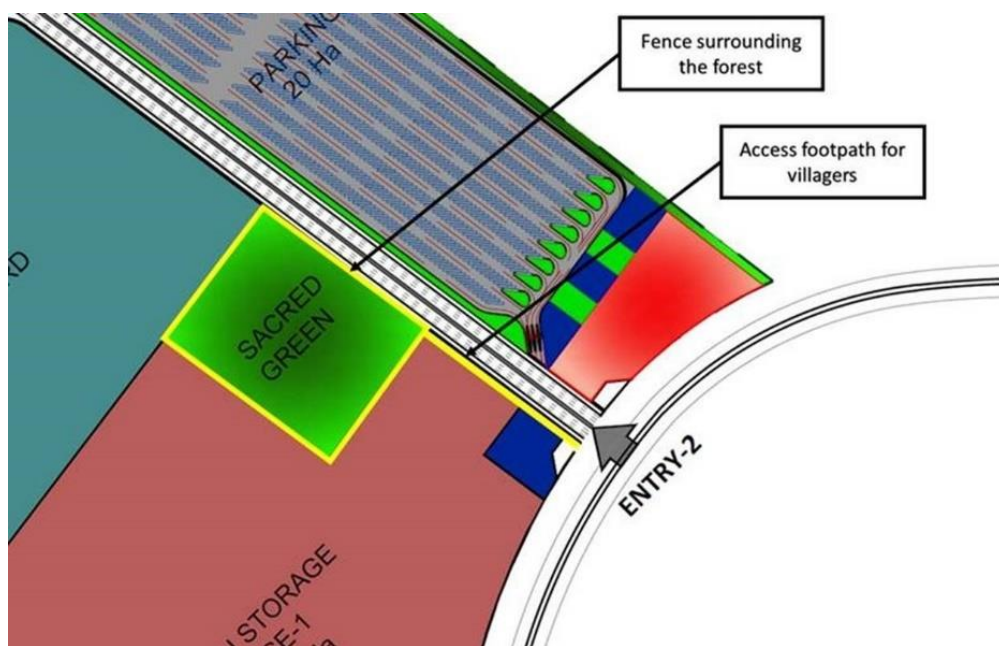


Figure 117 Sacred forest fencing

In terms of works planification:

- Carry out clearing activities outside the rainy season to reduce the risk of erosion and avoid the main period of bird reproduction. As much as possible, these activities have to be planned between November and March,

Regarding workers and spontaneous migration, in addition to measures regarding spontaneous migration detailed in section 7.4.3.3, following measures shall be applied:

- Formally prohibit hunting for all employees from in the Project area, as well as weapons and traps within the base camp and works area.
- Formally prohibit the consumption of bushmeat within the base camp and works area; a regular supply of animal protein will compensate the bushmeat and will be provided in the canteens / butcher / commissary of the base camp.

#### 10.4.1.1.2. Invasive species management

Under this Project, excavated land can be moved to other sites or reused elsewhere. Thus, the spread of seeds and seedlings of terrestrial invasive species from the study area to other areas is expected. Other invasive species could be accidentally introduced by improperly cleaned construction equipment from other areas. In order to limit this risk, it is requested to:

- Prohibit the movement of soil and material from one region to another. Chose, if necessary, a supply quarry near the site to limit this risk of bringing invasive species.
- Before transporting the engine from / to the Project site, clean the engine (interior and exterior) to ensure the absence of invasive plants.
- Revegetation of works rights-of-way using only species naturally present in Benin (indigenous) without invasive character.
- Cover the temporary storage of excavated soil with a waterproof geotextile to limit the development of invasive species. If plants of invasive species are identified, remove and burn them.

#### 10.4.1.2. Monitoring indicators

The monitoring indicators are:

- number of non-compliance observed, registered and treated,
- number of complaints about workers' hunting activities and accidental degradation of vegetation outside the right-of-way,
- number of invasive species cluster observed.

#### 10.4.1.3. Responsible for implementation and monitoring

The measures will be implemented and monitored by the main contractor and its subcontractors with regular reporting to GDIZ and ABE.

#### 10.4.1.4. Timeline

This plan applies to the whole construction phase duration.

### 10.4.2. Air emissions and noise management plan

#### 10.4.2.1. Objectives

The physical presence of the construction site will result in a disruption of air quality and noise environment. The objective of this plan is therefore to propose measures that will allow avoiding or reducing these nuisances.

The main contractor will have to develop an **air emissions and noise management plan** that comply with decree n°2001-110 of 4 April 2001 setting air quality standards and decree No. 2001-294 of 8 August 2001 Carrying the noise regulation in the Republic of Benin, IFC Performance Standards (PS 3) and the Environmental, Health and Safety (EHS) Guidelines, IFC, 2007. This plan will include at a minimum the following measures and propose additional measures if deemed necessary. The contractor will explain how he intends to implement these measures and through which material means.

#### 10.4.2.2. Measures for air quality conservation

The measures for air quality conservation are:

- **Limit the vehicles speed** to 30 km/h in all inhabited areas, and, if possible, pave the road section concerned,
- **Humidification**, when necessary, of unpaved village roads crossed by trucks and the excavated land stored on the construction site in case of severe drought and high winds,
- **Covering trucks** transporting pulverulent materials (as excavated soil),
- **Use of good quality equipment and vehicles**, preferably new, and **regular inspection and maintenance** of work engine and equipment (exhausts),
- **Dust monitoring**. Visual dust inspection of the site (Project area, work site and base camp) on a daily basis during the dry season, to gauge the effectiveness of dust mitigation measures, will occur at least 400 m from construction works.

If a thermal unit greater than or equal to 3 MW is installed for the production of energy on site, the gaseous emissions (PM, SO<sub>2</sub>, NO<sub>x</sub>) will have to comply with the standards of discharge and stack height of the IFC<sup>14</sup>.

#### 10.4.2.3. Noise measures

The measures for noise are:

- **Limit construction works to daytime hours where reasonable and feasible.** Engines shall not be started and on-site activities shall not be undertaken outside of the daytime construction hours. Non-noisy generating works can be undertaken at staging areas where works are not adjacent to residential receivers,
- **Using equipment that has been well maintained** so that noise emissions are minimised,
- **Construct physical noise barriers** along Project boundaries / around the main source to create a buffer between the Project site and surrounding populated areas,
- **Villagers are to be notified a minimum of 2 weeks prior to the commencement of construction works.** The notification would detail proposed construction works, permitted hours of work and potential noise impacts,
- **Transportation vehicles should maintain appropriate travelling speeds** along the roads and should avoid the running of engines for long periods of time when in a stationary position at the Project site,
- **Noise monitoring** to confirm the actual construction noise levels at representative sensitive receiver locations should be undertaken. This monitoring should be carried out at the start of the construction of the Project and on a quarterly basis.

#### 10.4.2.4. Monitoring indicators

The monitoring indicators are:

- number of complaints about noise and dust emissions,
- number of non-compliance observed, registered and treated,
- results of noise measurements.

#### 10.4.2.5. Responsible for implementation and monitoring

The measures will be implemented and monitored by the main contractor and its subcontractors with regular reporting to GDIZ and ABE.

#### 10.4.2.6. Timeline

This plan applies to the whole construction phase duration.

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<sup>14</sup> General environmental, health and safety directives, SFI, 2007. See in particular table 1.1.2 Small combustion installations: directive on emissions

### 10.4.3. Erosion and soil quality management plan

#### 10.4.3.1. Objectives

The objective of this management plan is to limit the impacts of activities such as earthworks, extraction, clearing, filling, intermediate storage of materials, and the installation of infrastructure that can directly affect the soil (soil quality, erosion) but also the natural environment in an indirectly manner (i.e. water quality). This plan aims to limit the risk of soil contamination and promote soil stability.

The main contractor will have to develop an **erosion and soil management plan** that will include at a minimum the following measures and propose additional measures if deemed necessary. The contractor will explain how he intends to implement these measures and through which material means.

#### 10.4.3.2. Measures to maintain soil stability

For the measures related to soil contamination, those defined in case of spillage in the section 10.4.5.5 related the water resources also applied for for maintaining environmental soil quality. Regarding soil stability, following measures should be set up:

- **Stripped soil management.** The soil storage area that will not be remobilised for 6 months will be covered with a thin topsoil to promote the development of herbaceous vegetation. The other temporary storage zones will be protected on their slopes by a synthetic cover. Deposits should not exceed 6 meters in height, their slope 1.5H / 1V and be equipped with a mid-height riser (3 meters).
- **Main excavation work shall be conducted during dry periods,** as much as possible. If necessary, a stormwater collection system, suitably sized by the main contractor can be proposed. These systems could be similar to infiltration drains created along the tracks through which the water will transit by gravity and emerge into the existing drainage lines of the site. A filtration system (silt fence as straw filters for example) allowing the reduction of the sediment content in the water will be set up regularly in the drains.
- **Implementation of silt fence** to retain the soil on disturbed land until the activities disturbing the land are sufficiently completed to allow revegetation and permanent soil stabilization to begin. A reasonable rule-of-thumb for the proper amount of silt fence is—30 meters of silt fence per 1,000m<sup>2</sup> of disturbed area (EPA stormwater best management practice). The silt fence shall be placed on slope contours or at the bottom edge of the soil piles to maximize ponding efficiency. Heavy porous filter fabric like geotextile with steel posts shall be privileged.
- **Optimization of cut and fill.** The design expected a neutral cut / fill balance sheet. This optimization limits costs as well as many environmental impacts such as energy consumption, GHG emissions, truck traffic, dust emissions and noise pollution.
- **Progressive soil rehabilitation** to avoid large erosion phenomena, especially during rainy season. The initial slopes will be reestablished to allow drainage of rainwater to the appropriate areas and prevent soil erosion. Overly compacted soils will be scarified. Revegetation and soil stabilization shall be considered, including for the work area and base camps.

#### 10.4.3.3. Monitoring Indicators

The monitoring indicators are:

- volume of cut and fill all along the Project;
- number of environmental accidents (i.e. spills, collapse of soil piles);
- number of complaints about soil degradation and erosion phenomena,
- number of non-compliance observed, registered and treated.

#### 10.4.3.4. Responsible for implementation and monitoring

The measures will be implemented and monitored by the main contractor and its subcontractors with regular reporting to GDIZ and ABE.

#### 10.4.3.5. Timeline

This plan applies to the whole construction phase duration.

### 10.4.4. Waste management plan

#### 10.4.4.1. Objectives

During construction, the waste generated will include:

- mainly construction waste (plaster, concrete, bricks, wood, drywall, fences, roofing materials, cement blocks, metal or plastic scrap, etc., including excess excavated soil etc.),
- domestic waste from work area and base camp,
- hazardous waste (waste generated by the use of petroleum products, chemicals, e.g. acids, alkalis, toxic substances and other laboratory materials, contaminated glass, etc.) from construction machinery and building materials.

The objectives of the plan are:

- to minimize the generation of waste through the thoughtful use of raw materials;
- to screen and treat waste in order to limit the impact on the environment;
- to sensitize and train staff in good waste management practices;
- through the implementation of this plan, to eliminate the risks of pollution of the biophysical environment and indirect impacts on the human environment (health, nuisances).

The main contractor will have to develop a **waste management plan** that comply with decree n°2003-332, August 27<sup>th</sup>, 2003 Carrying solid waste management and the decree No. 2003-330 of 27 August 2003 Carrying out waste oil management in the Republic of Benin and the Environmental, Health and Safety (EHS) Guidelines, IFC, 2007. This plan will include at a minimum the following measures and propose additional measures if deemed necessary. The contractor will explain how he intends to implement these measures and through which material means.

Employees will receive special training on good waste management practices. This training will be provided when the employees take up their posts (see section 1.1.1.1).



#### 10.4.4.2. Measures for waste management

Waste management must comply with Decree No. 2003-332 of 27 August 2003 on solid waste management and decree n°2003-330 of 27 August 2003 on waste oil management.

##### 10.4.4.2.1. Collection

A source separation system will be proposed to separate the waste generated and store it under appropriate conditions. The organization of collection will include the following points:

- signage of skips for each type of waste and storage points. The identification of the skips will be ensured in particular by means of pictograms or logos easily identifiable by all: wood and green waste, paper and cardboard, putrescible waste, inert waste, medical waste, sludge, motor oil, used chemicals, contaminated or non-contaminated metal waste;
- decentralized collection areas in the immediate vicinity of each work area. The waste stored here will be collected regularly and the storage bins cleaned;
- development of storage areas on an impermeable and closed surface to prevent the waste from flying away waste and equipped with retention bin. Special arrangements for the storage of hazardous waste must be provided for. The question of the compatibility of the storage of hazardous products must be taken into consideration when arranging the collection bins and canisters

The collection of waste from the storage areas should be carried out by specialized companies approved for these activities.

##### 10.4.4.2.2. Treatment and disposal

After acting on waste minimisation at source, the treatment strategy should be based on the principles of reuse, recovery and recycling before choosing as a last resort to send waste to disposal or landfill. In all cases, no waste should be left on site, dumped into the environment or burnt.

Depending on the waste, the choice of treatment will be as follows:

- putrescible waste: composting;
- green waste: composted or left at the disposal of the local communities (the modalities will be defined beforehand by the construction company, validated by ARISE in consultation with the local communities);
- waste glass, paper, cardboard, plastic and metal products not polluted by dangerous products: recycling by approved companies;
- inert waste (rubble, stones, earth, etc.): recovery in the form of quarry fill or reintroduced into a new concrete production process;
- waste oil waste: acceptable recycling (refinery) or disposal (fuel for industry such as cement works, foundries);
- chemical waste and paint residues and associated drums: reuse on site, returned to the supplier or to appropriate waste treatment facilities;
- waste electrical or electronic equipment: batteries, vehicle batteries, oil filters, light bulbs and lamps. The identification of a treatment channel, promoting recycling, will be carried out;
- pneumatic waste: recycling channel;

- sludge from settling ponds (presence of hydrocarbons): collection by a specialized company and treated as hazardous waste (recovery will have to be studied);
- sludge from septic tanks: collected by an approved transporter,
- medical waste: disposal in an approved center (incinerator).

At the end of the works phase, all waste storage area of work area and base camp will be emptied, cleaned and rehabilitated.

In case where GDIZ establishes a partnership (see section 10.3.2.2.1) with local companies as Nosito or Whyte Way (or other) to recycle plastic waste, the main contractor will have to be included in.

#### **10.4.4.2.3. Waste transportation**

Waste transportation must comply with Beninese legislation and will use a waste tracking for each transport operation. If no model is specified by local law, a model based on best practices will be adopted. This waste tracking must present at least the following information:

- name and identification number of the material (s),
- physical state (ie solid, liquid, gas or a combination of one or more states),
- quantity (eg kilograms or liters, number of containers),
- date of dispatch, date of transport and date of receipt,
- registration of the sender, receiver and transporter.

The waste trackings are applicable to the transport of both hazardous and non-hazardous waste.

The transport of waste to the disposal site will be carried out by a company specializing in these activities.

#### **10.4.4.2.4. Special case of contaminated land**

In case where land is identified as potentially polluted (pollution initially present or following an accidental spill), it must be analyzed in order to characterize the pollution and its level (if unknown) in order to select the most appropriate treatment process to the elimination of the contaminated soil.

If necessary, samples will be collected by qualified personnel applying good sampling practices. To assess soil or groundwater contamination, the following analyzes must at least be carried out by an accredited laboratory:

- HCT;
- PAH;
- Metals (As, Ba, Cd, Cr, Cu, Hg, Ni, Pb, Zn).

A report including soil and groundwater quality results will be sent to the EESU. This report will highlight the polluted areas with regard to Benines regulations and international standards (Dutch Standard for example). This report will conclude on the impacts of the Project on the natural environment.

In the event of proven pollution, a soil remediation plan must be developed by a specialized company. The rehabilitation strategy depends on the concentration of pollutants found, the availability of rehabilitation techniques in the country as well as the regulations.

Waste from the rehabilitation works will be sent to appropriate disposal facilities.

#### 10.4.4.3. Monitoring indicators

The monitoring indicators are:

- volume of waste produced by category,
- number of waste tracking,
- number of complaints about waste management (i.e. burnt waste or dumped waste),
- number of non-compliance observed, registered and treated.

#### 10.4.4.4. Responsible for implementation and monitoring

The measures will be implemented and monitored by the main contractor and its subcontractors with regular reporting to GDIZ and ABE.

#### 10.4.4.5. Timeline

This plan applies to the whole construction phase duration.

### 10.4.5. Hazardous products and spills management plan

The construction work will involve the handling of chemicals (hydrocarbons, paints, solvents) corresponding to hazardous materials.

The main contractor will have to develop a **Hazardous products and spills management plan** that comply the Environmental, Health and Safety (EHS) Guidelines, IFC, 2007 and will include at a minimum the following measures and propose additional measures if deemed necessary. The contractor will explain how he intends to implement these measures and through which material means.

#### 10.4.5.1. Objectives

A management plan for hazardous products will be put in place to detail the measures planned to minimize the risks of pollution of the biophysical environment and the health risks of the use of hazardous and polluting products. This plan also covers the conduct to adopt in case of emergency (spillage, fire, etc.).

Employees will receive special training on these practices. This training will be provided when the employees take up their posts (see section 1.1.1.1).

#### 10.4.5.2. Measures

The plan will be applicable during the construction phase to all Project activities involving the handling, storage and use of products classified as hazardous.

The information to be presented in such a plan will cover the following aspects regarding the overall management of the products:

- procedure for registering and monitoring any product of a hazardous nature, including in particular the listing of a safety data sheet for each product,
- procedure for identifying alternative, less hazardous products, for example limiting the choice of pesticides used to those authorised by World and health organization (WHO). Limit the use of equipment containing PCBs in accordance with the Stockholm Convention on Persistent Organic Pollutants ratified by Benin on 5 January 2005,

- prevention and emergency procedures in case of spills,
- conditions for the final treatment of residues or recycling.

More specifically, storage conditions should be studied to:

- **Identify the appropriate place for chemicals and dangerous products storage.** Storage on dedicated secure platforms: waterproof concrete slab surrounded by a low wall ensuring the retention of a volume at least equal to 110% of the largest container located on the platform (maximum of 10,000 l to be authorized for gasoline or diesel). The platform must be covered, and its evacuation equipped with an oil separator. Selected place shall way from any boreholes and wells and stagnant water area (incl. temporary).
- **Appropriate storage for dangerous products.** Label and store chemicals in appropriate areas and ensure compatibility of storage. Toxicity information and product safety data sheets will be available to workers on the site and from the ESU.
- **Identification of appropriate place for engine refuelling, maintenance and washing.** The maintenance and washing of engine and equipment will be limited to areas defined for this use, it will be covered with a roof and equipped with a concrete slab and a peripheral drainage evacuating runoff (rainwater or washing water) through an oil separator (hydrocarbon water) and/or sedimentation basins (sediment water). Selected place shall way from any boreholes and wells and stagnant water area (incl. temporary). Strict procedures will be defined for filling the tanks of the machines (type of equipment, dedicated areas).

Each storage site will be equipped with a recovery pit, sorbent kits and fire extinguishers. Standardized signs will warn of the presence of toxic products.

The storage of hazardous products will be regularly inspected to detect any leaks or damage to containers.

#### 10.4.5.3. Site emergency response plan

All types of emergencies that could occur during the construction phase have to be identified by the main contractor so that he can develop an appropriate site emergency response plan, whose content is outlined in § 8.2.2.2.2, and that defines intervention measures to limit the pollution or damages. This plan shall cover at least these 2 items:

- **Spillage.** An anti-pollution instruction will be set up to define the intervention procedures in case of occurring of an accidental spill. This instruction will include a description of the planned organization for an intervention and key persons involved. Specific training relating to the emergency response will be given to all employees involved in the procedure. They will be sensitized on the pollution control equipment to be deployed in contaminated areas: pollution control kits, sand, data sheet, etc.  
  
Spilled products will be recovered in the best conditions and stored in sealed containers before being disposed of in accordance with the waste management plan.
- **Fire.** Instruction in case of fire should be developed, especially for the sensitive locations such as the storage zone in the work area and the base camp. Sufficient fire defenses adapted to the area covered will be implemented. Specific training on the use of extinguisher should be provided to certain employees, but all employees shall be trained on the conduct to adopt in case of fire.

The administrations and services at the local and regional level to be notified in case of accident will be identified and informed on the emergency plan implemented.

#### 10.4.5.4. Monitoring indicators

The monitoring indicators are:

- monitoring of the hazardous products and MSDS registration,
- number of environmental or safety accident,
- number of training on emergency procedure,
- number of non-compliance observed, registered and treated.

#### 10.4.5.5. Responsible for implementation and monitoring

The measures will be implemented and monitored by the main contractor and its subcontractors with regular reporting to GDIZ and ABE.

#### 10.4.5.6. Timeline

This plan applies to the whole construction phase duration.

### 10.4.6. Water resource management and discharge management plan

#### 10.4.6.1. Objectives

The objective is to maintain the water resource, both in terms of quality and quantity, in particular by complying with the liquid discharge standards in force in the Republic of Benin and international standards (IFC and World Health Organization) to protect the groundwater quality in the Project area. This objective also makes it possible to limit the impacts on environmental elements sensitive to discharges, such as biodiversity and the surrounding human populations (health, agricultural and economic activities).

The fight against water pollution is part of the National Water Policy adopted in 2008 and in compliance with Law N°2010-44 of 24 November 2010 on water management in the Republic of Benin. Water pollution should therefore be considered systematically to avoid any adverse impact on other environments.

Note that the implementation of the waste management plan and hazardous product and spills management plans previously presented will help to preserve the quality of the water resource.

The main contractor will have to develop a water resource management and discharge management plan that comply with:

- decree No. 2001-094 of 20 February 2001 setting drinking water quality standards
- decree No. 2001-109 of 4 April 2001 on establishing wastewater quality standards in the Republic of Benin,
- IFC Performance Standards (PS 3) and the Environmental, Health and Safety (EHS) Guidelines, IFC, 2007.

This plan will include at a minimum the following measures and propose additional measures if deemed necessary. The contractor will explain how he intends to implement these measures and through which material means.

#### 10.4.6.2. Measures for water quality

A conventional sewerage network with wastewater treatment will be set up in all the work areas such as the base camp, storage area and the administrative area of the main contractor and subcontractor. As far as possible, releases by infiltration into the ground will be preferred to surface releases.

The recommendation is to set up a conventional sanitation network with wastewater treatment with installation of conventional septic tanks (sanitary infrastructures) for workers' camp and, because of the large surface of the site and depending on the location of the work area/base camp, installation of systems like dry latrine in the work area might be considered.

All area used for washing and maintenance of engines or equipment should be equipped with wastewater treatment systems. The main contractor must specify the treatment measures for water from washing concrete mixers or concrete plants, including the description of the treatment units (location, design of facilities, capacity, type of treatment, quality control at the outlet of the plant) and the expected results in terms of the quality of the discharge into the environment. A readjustment of the pH before discharge will probably be necessary.

Main contractor will propose in its management plan the location of all the discharges point, especially those to be monitored as wastewater discharges after treatment (sanitation), water discharges after oil separators (hydrocarbon storage area, maintains machinery, etc.).

The plan should take as references the values of the Beninese regulations and in case of unavailability in these regulations, the values of the WHO or any other internationally recognized standard to define the non-compliance of discharges. In particular, and at a minimum, the following bacteriological and physico-chemical indicators will be monitored quarterly during the construction phase:

- Sanitation: total coliforms, BOD5, COD, Total nitrogen, total phosphorus, pH, suspended solids,
  - Hydrocarbon separators: total hydrocarbons or oil and grease;
  - Sedimentation basin including discharge from the concrete plant: pH and suspended solids.
- The sedimentation basins are rehabilitated at the end of the construction phase.

The contractor will also specify the stormwater treatment measures including the description of the treatment units (location, design of the facilities, capacity, type of treatment, quality control at the outlet of the unit) and the expected results in terms of quality of discharge into the environment.

#### 10.4.6.3. Measures for water resources

The management of water resources also aims to maintain the groundwater quantity at an acceptable level allowing the continuity of uses for the inhabitants. It is not expected to drill a borehole for supply water, which should be provided **with bottles and tanks**.

Each worker should receive 3L of drinking water per day for consumption (WHO recommendation). A tank will be regularly filled out for works' needs (car washing, concrete preparation, etc.). This tank should be linked to a rainwater collection system to minimize the extraction from the local aquifer.

In order to favour the natural water ground infiltration, the main contractor should propose the selection of **porous asphalt** to favor water infiltration and reduce runoff water on all new roads for the Project needs.

#### 10.4.6.4. Monitoring indicators

The monitoring indicators are:

- monitoring of results of the discharge points monitoring (most restrictive threshold between local value / international standards),



- number of non-compliance observed, registered and treated.
- rate of treated water (on plan),
- selection of porous asphalt,
- water consumption and origin of water,
- number of complaints about water supply.

#### 10.4.6.5. Responsible for implementation and monitoring

The measures will be implemented and monitored by the main contractor and its subcontractors with regular reporting to GDIZ and ABE.

#### 10.4.6.6. Timeline

This plan applies to the whole construction phase duration.

### 10.4.7. Occupational hygiene, health and safety plan

#### 10.4.7.1. Objectives

The hygiene, health and safety at work plan will aim at deploying a set of activities that avoid or minimize risks to the health and safety of workers on the construction site and will ensure that workers employed on the construction site operate in healthy and safe conditions, thus reducing the risk of diseases, epidemics and accidents. This plan will consist in a hygiene and health component and a safety component.

This plan will comply with Law n°98-004 of 27 January 1998 on the labour code in the Republic of Benin, International labour law (ILO), IFC Performance Standards (PS 2) and the General Environmental, Health and Safety Guidelines from IFC.

It must also meet ARISE's Minimum OHS Standards for Construction Contracts.

#### 10.4.7.2. Measures related to work environment

Measures to reduce the impact on the various environmental components (soil, air and water) that indirectly limit the impact on the health and safety of workers have already been developed in previous management plans which are listed below:

- water resource management and discharge monitoring plan;
- air emissions and noise management plan;
- waste management plan;
- hazardous products management plan.

#### 10.4.7.3. Measures for the health and safety at work

The main contractor will have to develop an **Occupational hygiene, health and safety management plan** in compliance with previously stated regulations and best practices. This plan will comply with ARISE ESMS manual requirements:

- **Resources** are in place to implement the requirements of the OHS management system.

- Contractor personnel receive the **required training** for the safe performance of the assigned tasks.
- Systems are in place for **routine auditing and inspection** to ensure the compliance with the applicable national and international requirements and conformity with ARISE ESMS requirements.
- Systems are in place for **reporting and investigations** of environmental events, near-misses, accidents, incidents and potential hazards within an agreed and legally required timeframe.
- **Progress updates** are provided to GDIZ on an agreed basis on the OHS performance.
- All **records** and other relevant **documentation** are kept showing compliance/conformity to Project requirements for the duration of the Contract.

In addition, this plan will include at a minimum the following measures for each category. The contractor will be able to propose additional measures if deemed necessary. The contractor will explain how he intends to implement these measures and through which material means.

Table 52 : Minimal content of the Occupational hygiene, health and safety management plan

Category	Minimal measures to develop
HSE organisation	<ul style="list-style-type: none"> <li>- Recruit an HSE coordinator in charge of monitoring the proper implementation of HSE management plans</li> <li>- Perform a job hazard analysis (JHA) covering physical, chemical and biological hazards for each type of job planned on the construction site and detail associated prevention measures</li> <li>- Identify jobs or tasks requiring specific permits</li> </ul>
Worker's rights	<ul style="list-style-type: none"> <li>- Respect the Labour Code of Benin (cf. § 10.3.1.5) and especially: <ul style="list-style-type: none"> <li>○ Working time of 40 hours per week which should not exceed 8 hours per day</li> <li>○ Overtime to be paid at an increased rate fixed by means of a collective agreement or convention</li> <li>○ Overtime at night worked between 9 p.m. and 5 a.m</li> <li>○ Minimum wage (SMIG) at 40,000 CFA per month</li> <li>○ Medical check-up at the time of hiring and periodic check-up for all employees</li> </ul> </li> <li>- Respect the 8 fundamental ILO conventions to which Benin is a signatory and ensure: <ul style="list-style-type: none"> <li>○ No forced labour</li> <li>○ No work for children under 14 (12 for light work)</li> <li>○ Prohibition of worst forms of child labour – child under 18 (including hazardous child labour such as work underground, at dangerous heights, confined spaces, with dangerous machinery or tools, in an unhealthy environment exposing to hazardous substances, heat, noise levels or vibrations)</li> </ul> </li> </ul>

Category	Minimal measures to develop
	<ul style="list-style-type: none"> <li>○ No discrimination including against women</li> <li>○ Respect for freedom of association and protection of the right to organise collective bargaining</li> <li>○ Equal remuneration</li> </ul> <ul style="list-style-type: none"> <li>- Respect the various regulations on health and safety at work, in particular Order No. 022/MFPTRA/DC/SGM/DT/SST on general measures of health and safety at work</li> </ul>
<b>Safety of workers</b>	<ul style="list-style-type: none"> <li>- Make adequate PPEs (adapted to the job hazard analysis results and the workstation) available to workers and ensure that they are worn</li> <li>- Control PPE expiration date and ensure replacement of expired PPE</li> <li>- Ensure sufficient air supply and lighting in all working environments</li> <li>- Ensure adequate work environment temperature in all working environments and provide ventilation system in hot spaces</li> </ul>
<b>Hygiene of workers</b>	<ul style="list-style-type: none"> <li>- Provide decent, safe and sufficient locker rooms and sanitary facilities (toilets, showers and washbasins) for the number of people expected to work in the facility (including separate facilities for females). Toilet facilities should also be provided with adequate supplies of hot and cold running water, soap, and hand drying devices</li> <li>- Provide enough potable drinking water to all workers</li> <li>- Provide clean eating areas</li> <li>- Where workers may be exposed to substances poisonous by ingestion and skin contamination may occur, facilities for showering and changing into and out of street and work clothes should be provided</li> </ul>
<b>Safety of workplace</b>	<ul style="list-style-type: none"> <li>- Ensure safe access to all workplaces including emergency access and exits</li> <li>- Display on site pictograms adapted to the OHS risks and PPE wearing obligations</li> <li>- Install hand, knee and foot railings on stairs, fixed ladders, platforms, etc. on any area requiring it</li> <li>- Define clear loading/unloading areas, parking and material storage areas</li> <li>- Segregate passaways for pedestrians and vehicles</li> <li>- Install fire fighting systems with adequate equipment and signal them</li> <li>- Control expiration date of fire fighting equipments (fire extinguishers) and replace expired items</li> <li>- Identify fire-fighting responsibilities and conduct emergency drills</li> <li>- Ensure integrity of workplace structures</li> <li>- Signal hazardous areas and label hazardous equipment, communicate to workers on hazard codes</li> </ul>

Category	Minimal measures to develop
	<ul style="list-style-type: none"> <li>- Install emergency response equipment for all types of emergencies identified in the Site emergency response plan</li> </ul>
<b>Health of workers</b>	<ul style="list-style-type: none"> <li>- Conduct medical check-up for new workers</li> <li>- Detail and implement a plan to prevent and control epidemics and parasitic diseases including: <ul style="list-style-type: none"> <li>o prevention of COVID-19 epidemic</li> <li>o prevention and control of STDs and HIV/Aids (including free availability of condoms to site personnel and awareness-raising)</li> <li>o prevention of other communicable diseases with epidemic potential</li> </ul> </li> <li>- Set up a dispensary to provide basic medical services to workers and to manage emergency interventions in case of accidents. The medical team composition will be adapted to the number of workers and will be placed under the responsibility of a qualified nurse;</li> <li>- Set up an emergency and first aid management system with the placement of first aid kits (including defibrillators) in each site area</li> <li>- Identify and train qualified personnel to be first aiders</li> <li>- Identify reference hospitals for medical evacuation of seriously wounded persons</li> </ul>
<b>Workers' behavior</b>	<ul style="list-style-type: none"> <li>- Write a Code of conduct applying to all workers on site (including subcontractors) and make its signature compulsory at the recruitment of each worker</li> <li>- Write an internal regulation and post it on strategic locations</li> <li>- Implement a training and awareness-raising program for workers covering: <ul style="list-style-type: none"> <li>o OHS risks specific to the worksite and the wearing of PPEs;</li> <li>o road safety issues for truck drivers;</li> <li>o prevention and control of epidemics and parasitic diseases;</li> <li>o awareness-raising and communication for a change in behavior on the worksite (for STDs and HIV);</li> <li>o and all other aspects listed in § 1.1.1.1.</li> </ul> </li> </ul>
<b>Workers' grievance management</b>	<ul style="list-style-type: none"> <li>- Detail the grievance management procedure that will be set up to receive and treat workers' claim that might arise from their rights or working conditions.</li> <li>- This procedure will have to be connected to GDIZ general Grievance management procedure and its detailed Worker's grievance mechanism as part of its ESMS.</li> </ul>

The table below presents an example of PPE that must be proposed to workers depending on the hazard they are exposed to.

**Table 53 : IFC recommended PPE**

<b>Table 2.7.1. Summary of Recommended Personal Protective Equipment According to Hazard</b>		
<b>Objective</b>	<b>Workplace Hazards</b>	<b>Suggested PPE</b>
Eye and face protection	Flying particles, molten metal, liquid chemicals, gases or vapors, light radiation.	Safety Glasses with side-shields, protective shades, etc.
Head protection	Falling objects, inadequate height clearance, and overhead power cords.	Plastic Helmets with top and side impact protection.
Hearing protection	Noise, ultra-sound.	Hearing protectors (ear plugs or ear muffs).
Foot protection	Falling or rolling objects, pointed objects. Corrosive or hot liquids.	Safety shoes and boots for protection against moving & falling objects, liquids and chemicals.
Hand protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures.	Gloves made of rubber or synthetic materials (Neoprene), leather, steel, insulating materials, etc.
Respiratory protection	Dust, fogs, fumes, mists, gases, smokes, vapors.	Facemasks with appropriate filters for dust removal and air purification (chemicals, mists, vapors and gases). Single or multi-gas personal monitors, if available.
	Oxygen deficiency	Portable or supplied air (fixed lines). On-site rescue equipment.
Body/leg protection	Extreme temperatures, hazardous materials, biological agents, cutting and laceration.	Insulating clothing, body suits, aprons etc. of appropriate materials.

(Source: Environmental, Health and Safety (EHS) Guidelines, IFC, 2007)

#### 10.4.7.4. Monitoring indicators

Monitoring indicators related to the soil, water and air components are presented in the environmental management plan for the construction and operation phases. They are therefore not listed in detail in the table below.

The other indicators are as follows:

- number of JRA conducted;
- presence and effective wearing of protective equipment (PPE) on the construction site;
- number of accidents that have occurred and type of accidents (lack of adequate equipment, flammable substances, road, welding work, etc.);
- number of sick workers and type of illnesses;
- number of awareness sessions on the risks associated with the presence of the worksite;
- number of workers who signed the Code of conduct;
- number of claims lodged by workers on their working conditions or rights.

#### 10.4.7.5. Responsibilities for implementation and monitoring

Responsibility for the implementation of this plan lies with the main contractor. GDIZ and ABE will be responsible for supervising and monitoring the proper implementation of the plan.

#### 10.4.7.6. Timeline

This plan applies to the whole duration of the construction phase.

### 10.4.8. Cultural heritage management plan

#### 10.4.8.1. Objectives

The cultural heritage management plan in construction phase aims at protecting the Anavie sacred forest and the potential archaeological artefacts that could be buried on site from Project impacts that will be caused by the construction works. Indeed, such works will require the removing of the vegetation, earthmoving and excavation activities that might cause damages to the forest or destruction to such artefacts.

#### 10.4.8.2. Measures for Anavie sacred forest

The contractor will propose a Cultural heritage management plan where he will underline how he intends to protect Anavie sacred forest during the construction works. The following measures must be compulsorily detailed by the contractor:

- Marking of the forest limits with clear markers (red ribbon or any other means deemed suitable) to prevent damages to the forest. Marking will have to be done in collaboration with Anavie village authorities to ensure it is correctly performed.
- Prohibiting the use of bulldozer to proceed with tree cutting and vegetation removal at less than 30 meters from the sacred forest;



- Awareness-raising to all workers including subcontractors' workers, especially drivers of construction engines, about the presence of the forest and cultural rules governing it: prohibition of entry for any purpose, of tree cutting, of waste storage, etc.
- Arranging of a safe passage that must be left accessible during the works to villagers wishing to go into the forest.

The contractor can propose any additional measures deemed necessary. He will also detail the material resources and organizational means he will deploy to guarantee the forest protection.

#### 10.4.8.3. Chance-find procedure for archeological findings

Before the beginning of the construction works, a clear and well communicated chance-find procedure must be implemented. This procedure must be aligned with Benin regulation (see § 3.1.9) and must rest on the following actions:

- Identification of a qualified archaeologist to intervene whenever an artefact is found.
- Determination of the information process after the finding.
- Information to all workers on the archeological potential of the study area, the type of artefacts that could be found (potteries, tools, former settlements, cemeteries, graves, etc.) and the procedure to be followed:
  - Stop all works in the vicinity of the find, until a solution is found for the preservation of these artefacts, or advice from the relevant authorities is obtained;
  - Immediately notify the site HSE manager and construction supervisor;
  - Record details in an incident report and take photos of the find;
  - Delineate the discovered site or area; secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities take over;
  - Call on the archaeologist so that he can conduct preliminary evaluation of the findings. The archaeologist must make a rapid assessment of the site or find to determine its importance. Based on this assessment the appropriate strategy can be implemented. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage such as aesthetic, historic, scientific or research, social and economic values of the find;
  - The archaeologist must prepare a report on his work which is sent to the Ministry of tourism, culture and arts for assessment;
  - The Ministry will issue a notification to the archaeologist or the contractor on the suspension of works and the safeguard measures to be implemented. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage;
  - Construction works could resume only after permission is granted from the responsible authorities.

#### 10.4.8.4. Monitoring indicators

The monitoring indicators are:

- number of artefacts found and preserved during the works;

- number of complaints lodged in relation to cultural heritage sites.

#### 10.4.8.5. Responsibilities for implementation and monitoring

The measures will be implemented and monitored by the main contractor and its subcontractors with regular reporting to GDIZ, ABE and Ministry of Tourisme, Culture and Arts.

#### 10.4.8.6. Timeline

This plan applies to the whole construction phase duration.

### 10.4.9. Traffic and road safety plan

Road traffic is the first cause of accidents during the construction phase of projects. The movement of site equipment and materials, circulation of machinery and vehicles during the various phases of the Project can increase the risk of accidents, especially when crossing built-up areas.

In addition, the good quality of RNIE 2 may encourage overspeeding, which may contribute to a rise in traffic accidents on the roads. Traffic at high speeds and especially passing in front of villages and social community facilities (schools, places of worship or health centers) can also, because of the crowding in these places, be a source of accidents.

#### 10.4.9.1. Objectives

The objective of this plan is to regulate traffic both inside and outside the site in order to limit accidents to persons, both Project workers and residents.

#### 10.4.9.2. Measures for the main contractor

The main contractor will have to develop a **Traffic and road safety plan** that will comply with the measures listed below and propose additional measures if deemed necessary. The contractor will explain how he will implement these measures and through which material means.

The plan will cover the following thematic:

##### Control of drivers' capacities and vehicle suitability

- conduct a proficiency (including eyes) test of all drivers at the time of hiring;
- train drivers of light vehicles and trucks in basic road safety and risk awareness;
- give specific permits to the drivers of construction site machinery and heavy vehicles;
- present traffic regulations to drivers and the sanction system in case of non-compliance;
- conduct unannounced speed checks, control drivers regularly and penalize driving for excessive speed or drunkenness;
- check trucks, their general condition, load and stowage;
- ensure that the transport of hazardous materials complies with local regulations and international specifications;
- prohibit traffic at night unless an exemption is issued by GDIZ HSE manager.

#### **Traffic plan on construction site**

- develop a **traffic plan applying on the construction site** presenting which roads will be opened on site, the associated traffic regulations measures (speed limits, access permits, etc.) and materials to be installed (traffic signs, lights, bumps, speed humps, road signs, etc.) depending on the type of road;
- protect the work areas from road traffic (barriers, road signs, etc.);
- clearly delimitate pedestrian pathways and create pedestrian-only areas within the works areas and their surroundings.

#### **Traffic plan outside of construction site**

- develop a **traffic plan applying outside the construction site** presenting which public roads will be used by the vehicles, at what period of the year and expected time of the day and for what duration. This plan will detail:
  - applicable traffic regulations particularly near the villages closest to the Project site, including the type and amount of equipment to be installed, their location and speed limits to be respected;
  - installation of temporary traffic lights or traffic warden to make it safer for vehicles to access construction sites from the main road;
  - delivery and disposal frequencies (equipment, waste, etc.) to be compatible with the absorption capacity of local traffic.

In the event of the need to obstruct the public roadway and especially RNIE 2, the contractor will contact local authorities (Prefect and mayors) and the relevant administrations (Departmental Directorate for Infrastructure and Transport for Atlantic/Littoral) to discuss the most appropriate alternative routes and get validation from these authorities.

Any development on the public roadway for the purposes of the Project (installation of temporary traffic lights, signs or road signs, bumps, etc.) or for the purpose of improving road safety, including changes in traffic direction or deviations, must be communicated in advance to the same authorities and approved by them.

#### **10.4.9.3. Monitoring indicators**

The monitoring indicators are:

- number of driver proficiency tests conducted;
- number of road accidents caused by a Project vehicle;
- number of claims lodged by communities on road safety and traffic.

#### **10.4.9.4. Responsibilities for implementation and monitoring**

In the construction phase, the Traffic and road safety plan will be implemented by the main contractor.

During this phase, the contractor will also be responsible for liaising with the other actors of the Project taking place in the same area (Glo-Djigbe airport) in order to mutualize the implementation of the traffic management plan and significantly reduce the cumulative impacts of these 2 projects.

Monitoring is ensured by GDIZ and ABE.

#### **10.4.9.5. Timeline**

This plan applies to the whole duration of the construction phase.

#### **10.4.10. Community health and safety plan**

##### **10.4.10.1. Objectives**

The community health and safety plan aims at avoiding or reducing the effects of the Project on the health and safety of the communities during the construction phase. The main risks are related to the community exposure to traffic accidents, accidents on site during the works and degradation of community health conditions due to an influx of workers and economic migrants leading to a potential increase in the prevalence of various diseases such as STDs and HIV/Aids.

##### **10.4.10.2. Measures**

In addition to the measures of the **Occupational hygiene, health and safety management plan**, which aim at guaranteeing the good health of the site personnel and thus avoid the risk of spread of disease among the populations, a program of action will be implemented at the level of the communities of Tori-Bossito and Ze, and in particular in the villages located in the immediate vicinity of the Project site. The program implementation will be under mixed responsibilities as detailed below.

This program will cover the following actions:

##### **Road safety arrangements with local communities – main contractor responsibility**

The road safety component will include procedures requiring the main contractor to inform local communities on its traffic plan and especially:

- inform inhabitants on the start of works at least 2-weeks before;
- collaborate with local communities and the relevant administrations to improve signage, visibility and general safety on the road, especially near public places and schools;
- define in advance the routes and conditions for using single-track access and inform residents thereof;
- provide an emergency medical procedure in the event of a road accident involving a Project vehicle and a local resident. The injured persons will be taken care of by the site dispensary and, if necessary, evacuated to the zone hospital, at the contractor's expense;
- ensure that access to / from public and private healthcare establishments located on or in the immediate vicinity of the Project area is maintained. It is essential that communities can continue to access healthcare during the works and that emergency vehicles are able to reach traffic routes or the sites concerned quickly.

##### **Protection against intrusions on site and security personnel management plan – main contractor responsibility**

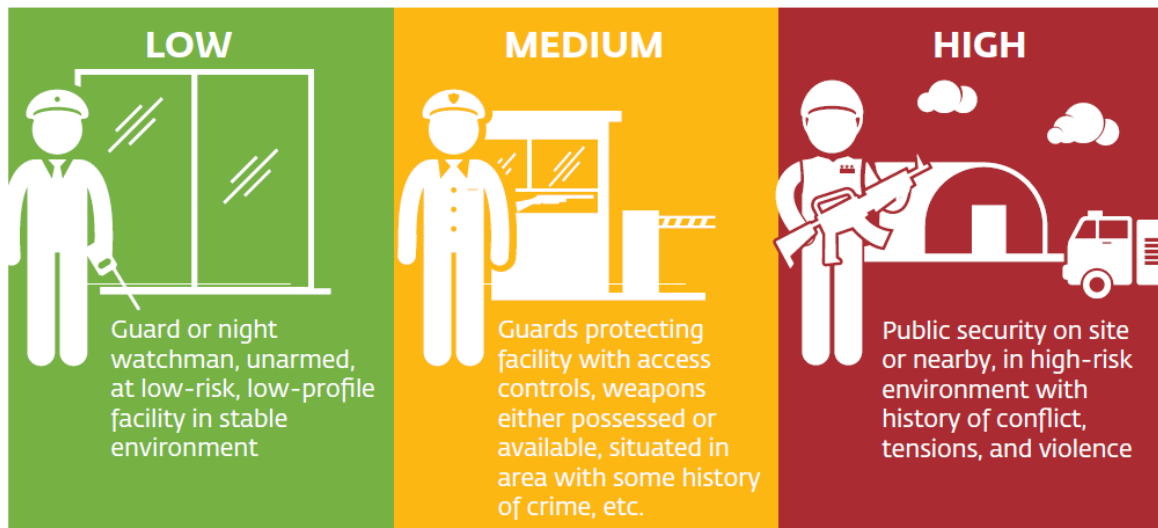
The contractor will need to secure access to the construction site to avoid trespassing, accidents and material thefts:

- deploy an anti-intrusion and security system for the work site areas 24/7 detailing the features of the system (fence, barbed wire, CCTV, remote control or on-site guard presence, etc.);
- set up site access controls (badges with identifications) with one or more vehicle control points.

The contractor will have to write down clear procedures for the management of security personnel (both public and private) if he hires guards directly or through sub-contracting to secure the worksite

during construction works. These procedures will have to comply with IFC (2017), *Good practice handbook, Use of security forces: assessing and managing risks and impacts*. They will have to cover at a minimum:

- **Security risk assessment:** the contractor will have to assess each security risk weighting on its operations (such as site trespassing, theft, sabotage, demonstrations, etc.) depending on the current safety context (cf. § 6.5.1.6.3) and propose appropriate security responses with associated means and material (uniform, identification, communication device, weapons). The scheme below proposes a profile of security personnel for 3 levels of risk. It is most likely that the Project will be in the Low category.



Source: (2017), *Good practice handbook, Use of security forces: assessing and managing risks and impacts*

**Figure 118 : Security personnel profile depending on risk level**

The arrangements will also detail the cases where recourse to public police forces and the army will be required for support, in case of escalation or for investigation after a theft for exemple.

- **Background checks and hiring:** the company or security personnel recruited will have to undergo a preliminary background check to ensure that they were not involved into previous allegations of human rights violations, excessive force use or disproportionate security response. Interviews and credentials checking with past employers will allow to avoid selecting companies or individuals with history of past abuse.
- **Code of conduct:** each security worker will have to sign a Code of conduct which will underline its obligations, the respect due to local communities and the conditions in which they will be exposed to sanctions.
- **Use of force:** the situations where the use of force will be prohibited or requested will be clearly described and communicated so that guards know how to behave in each situation.
- **Community engagement:** security personnel should be informed about their role in community relations and about the existence of a grievance mechanism where communities can lodge their claim. They should also receive clear directives on the key issues requiring specific messaging to local communities.
- **Incident reporting:** the chain of command and the reporting procedure to the construction site manager and GDIZ will have to be detailed.

- **Training:** the security personnel will be trained on his role and responsibilities upon recruitment and on a regular basis afterwards. Training should focus on appropriate behaviour and use of force. In low-risk contexts this can involve just a brief review of policies and procedures to ensure that guards understand how to respond to common interactions and scenarios.

#### **Road safety awareness-raising with local communities – GDIZ responsibility**

A sensitization program targeting community road safety will be deployed by GDIZ. It includes the deployment of:

- Road safety awareness-raising sessions for the persons living along the future Project access roads. This program will consist in organizing one session per year during construction works in the villages of Dokanme, Gbetaga, Sogbe and Zebe in that of Tori-Bossito and of Agbodjedo, Anavie, Djitin-Aga and Houeze in the municipality of Ze.
- Road safety awareness-raising targeting local primary schools of these 8 villages and listed in 6.5.7.2. Again, one session per year and per village will be realized during construction works.

GDIZ can seek a partnership with the National centre for road safety (CNSR) to perform this road safety program that could be linked directly to the worldwide organization of the road safety week.

#### **Community hygiene and health awareness-raising – GDIZ responsibility**

GDIZ will implement an awareness-training program targeting community hygiene and health during construction. This program will include:

- an annual awareness-raising campaign in the 8 villages of the study area on the basic rules for hygiene, water, sanitation, health, safety, environmental protection;
- an annual program to raise awareness among local populations of the risks of contamination by STDs and HIV/Aids through an NGO competent in the field (including distribution of male condoms during the sessions). This could be organized during World Aids Day held each year on the 1<sup>st</sup> of December.

These campaigns can be realized in partnership with the Tori-Cada and Tangbo-Djevie district health centres and the local NGOs already working in the study area (cf. § 1.1.1.1).

#### **10.4.10.3. Monitoring indicators**

The monitoring indicators are:

- number of awareness-raising sessions held;
- number of health and safety complaints.

#### **10.4.10.4. Responsibilities for implementation and monitoring**

The community health and safety plan will be partly the responsibility of GDIZ and partly the one of the main contractor.

Monitoring is carried out by GDIZ and ABE.

#### **10.4.11. Social inclusion plan**

##### **10.4.11.1. Objectives**



The objectives of a social inclusion plan are to give access to Project opportunities (employment in particular) to persons in vulnerable situations and women, who are usually excluded from them, and to promote the just, respectful and equitable treatment of these persons.

In construction phase, the program implementation will be under mixed responsibilities as detailed below.

#### **10.4.11.2. Measures**

Different measures will be taken whether they concern women or vulnerable groups.

##### **Respect for laws and international standards – main contractor responsibility**

- respect Beninese national legal framework and international standards concerning gender equality and the fight against violence made to women;
- respect Benin's national legal framework and international standards concerning PWDs and the prohibition of child labour;
- conduct regular controls to ensure no children under 14 are employed on the construction site.

##### **Recruitment strategy – main contractor responsibility**

- **quota setting for recruitment among women and vulnerable groups:** it is proposed that a binding quota for the recruitment of women and disabled persons is set up at 5% of the total recruited employees both on the construction site and during operation. Note that the Benin government offers financial incentives for companies hiring disabled persons, as underlined in § 3.2.6.2.
- involve the Social Protection Centers (CPS) in the identification and mobilization of vulnerable persons for employment, in view of their good knowledge of vulnerable populations in their respective areas of action.

##### **Social inclusion on the worksite – main contractor responsibility**

- facilitate women integration on the site by setting up dedicated infrastructure for them (toilets, bathrooms, etc.);
- facilitate PWDs integration on the construction site by setting up infrastructures dedicated to them (access ramps, etc.);
- raise awareness among workers on the rights of vulnerable persons in the Code of Conduct;
- raise workers' awareness on gender equality, discrimination and violence against women and the risks of STDs and HIV/AIDS;
- condemn any form of gender-based violence by site workers in the Code of Conduct and plan disciplinary measures for offenders;
- condemn any form of discrimination against vulnerable persons by site workers in the Code of Conduct and plan disciplinary measures for offenders;
- plan for a grievance mechanism adapted to the reception and treatment of gender-based violence.

##### **Social inclusion in decision-making bodies – GDIZ responsibilities**

- include women's representatives in the monitoring committee of the ESMP;
- include vulnerable groups' representatives in the monitoring committee of the ESMP.

- during any decision-making process, ensure that the opinion of women is expressed (by asking them to speak), if necessary by inviting them to dedicated meetings or by organising meetings directly with associations representing women;

Two additional measures will be implemented:

- authorize women to carry out income-generating activities (IGA) near the construction site in order to benefit from the positive effects of the presence of workers;
- monitor the evolution of the status of women and vulnerable groups and the potential impacts of the Project on them by organizing regular focus groups with them.

#### **10.4.11.3. Monitoring indicators**

The monitoring indicators are:

- number of women recruited on the site;
- number of PWDs recruited on the site;
- number of complaints recorded relating to social inclusion.

#### **10.4.11.4. Responsibilities for implementation and monitoring**

Monitoring is carried out by GDIZ and ABE.

#### **10.4.11.5. Timeline**

This plan must be deployed before the construction starts so that when recruitment begins, the measures are ready to be deployed.

### **10.4.12. Social influx management plan**

#### **10.4.12.1. Objectives**

Project-induced in-migrations, also called social influxes, have many impacts on the host communities:

- disruption in the lifestyle of host populations;
- price inflation of properties and services;
- social conflicts between workers and host populations;
- development of delinquency and banditry.

The Social Influx Management Plan will serve 3 purposes: limiting influxes as much as possible, monitoring them to ensure the limitation measures are effective, and acting to provide compensation measures in case the influxes become uncontrollable. Its implementation along with the Local employment program (cf. § 10.3.1.2) will also ensure the optimal allocation of jobs to local communities.

#### **10.4.12.2. Measures**

Several measures can be deployed to limit social influxes, monitor them and take corrective action if they become problematic.

##### **Limiting influxes**

- Under contractor responsibility: prohibit recruitment at the gate/worksites and set up a decentralized recruitment office;
- Under GDIZ responsibility: in partnership with municipalities of Tori-Bossito and Ze, develop a communication plan and an information campaign on real job opportunities to reduce opportunistic immigration. The information program will include information on job availability, recruitment processes and the priority given to the local communities most affected by the Project.

### **Monitoring influxes**

The monitoring will require GDIZ to perform regular interviews with a set of local stakeholders in order to get information on several indicators:

- **New settlements:** monitor the settlement of newcomers in the 8 villages in the study area with the village chiefs. Village chiefs will be tasked by GDIZ to conduct a census of the current number of village inhabitants in agreement with the municipalities. Once done, they will be asked to record the number of new arrivals and report it monthly to GDIZ.
- **Price inflation:** implement a price monitoring of a basket of local commodities (palm oil, sugar, maize, rice, gasoil, building land, etc.) in order to identify any inflation tendency. This has to be done every 2 months and the derived inflation rate has to be compared to the Benin inflation rate at the moment of the price monitoring.
- **Health status:** monitor the health status of the population and the level of overloading of public health infrastructure through interviews with Tori-Cada and Tangbo-Djevie district health centres every 2 months.
- **Pressure on local resources:** monitor food and water resources availability through interviews with the 8 head of villages every 2 months.
- Monitor complaints through the complaints management mechanism to identify complaints arising from social influxes and take appropriate remedial action.

### **Acting in case of large influxes**

In the event of deterioration of one or several of these indicators (steep increase in new settlements, overloading of district health centres, high inflation rates), GDIZ will implement compensation measures as follow:

- A **targeted program to strengthen water supply infrastructure** in the 4 most affected villages of Agbodjedo, Anavie, Djitin-Aga and Houeze (through donations to adequate authorities or building of new infrastructures) in coordination with local authorities.
- A **support to public health centres** of Tori-Cada and Tangbo-Djevie through a donation of material after an assessment of these health centres needs.

This program will be linked to the voluntary community development contribution plan proposed in § 10.3.1 to support the development of the communities surrounding the Project site.

### **10.4.12.3. Monitoring indicators**

The monitoring indicators are:

- population health monitoring report from district health centres;
- number of new residents reported in the villages by the village chiefs;
- number of complaints about social influxes;

- number of public infrastructures built due to social influxes.

#### **10.4.12.4. Responsibilities for implementation and monitoring**

The implementation is the responsibility of GDIZ. Monitoring will be carried out by ABE.

#### **10.4.12.5. Timeline**

This plan applies to the whole construction phase duration.

### **10.5. ESMP in operation phase**

#### **10.5.1. GDIZ's ESMP**

In operation phase, GDIZ will:

- Monitor its common infrastructures so that air and noise emissions, discharges, consumption along with HSE requirements comply with applicable regulations and IFC best practices through a:
  - Water resource management and discharge management plan
  - Traffic and road safety plan
  - Waste management plan
  - Occupation hygiene, health and safety plan
  - Maintenance plan for common infrastructures: electrical substations, outdoor areas
  - Emergency management plan
- Implement a human resources management plan including a local recruitment program, a social inclusion plan and a cultural heritage management plan;
- Continue the SEP implementation and follow up (see Annex II).

The content of these plans is briefly described below. GDIZ will develop these procedures for the exploitation of its utilities and facilities.

##### **10.5.1.1. Water resource management and discharge management plan**

The main focus of this plan will be on the following points.

##### **Water discharges management in the central drain inside the GDIZ**

- stormwater from GDIZ plots with oily process operations will be drained through oil interceptors before being discharged in the drainage networks;
- each outfall location must be equipped with grates or nets to arrest the debris. These grates and nets shall be regularly inspected to verify their condition;
- monitoring of all liquids effluents discharges in the environment. Discharges must comply with the standards specified in the GDIZ General operating guidelines, Beninese regulations and international best practices.

Once the CETP and STP processes are defined and the ESIA conducted, a dedicated E&S management procedure for each utility must be developed and implemented based on the results of the ESIA.

#### **Water management in the central drain outside GDIZ site boundaries**

- ensure the Government will provide a solution so that GDIZ waters are discharged correctly up to the Lama depression;
- in case a solution is not found and flooding occur, compensate land owners, farmers and building owners for the damages caused to their assets by the flooding;
- find a permanent solution to prevent flooding from occurring again (in the absence of action by the Government).

#### **Water resources management regarding GDIZ functioning:**

- set up measures to limit to avoid or reduce water usage including the use of additional technically feasible water conservation measures within the promoter's operations, the use of alternative water supplies or water consumption offsets to reduce total demand for water resources to within the available supply.
- water consumption monitoring for the entire GDIZ (GDIZ infrastructures and industrial units).

#### **Water resources management regarding community uses:**

- regularly assess the efficiency of the various hydraulic systems in the 8 villages of the study area through interviews with the head of villages.
- in case of observed impacts, build additional village hydraulic systems should the water flow reduce or stop on existing ones.

#### **10.5.1.2. Traffic and road safety plan**

Like the construction phase, the operation phase will require that a strong attention is paid to traffic and road safety due to the high risks that it represents for GDIZ workers, clients and local communities. The plan will rest on several actions detailed below.

##### **Control of drivers' capacities and vehicle suitability**

In operation phase, the vehicle fleet will be shared between GDIZ, who will use vehicles for its daily operations, and the industries. GDIZ will be responsible to maintain the good condition of its fleet of vehicle and the competencies of its pool of drivers, with the following actions to be implemented:

- conduct a proficiency (including eyes) test of all drivers at the time of hiring;
- train drivers of light vehicles and trucks in basic road safety and risk awareness;
- give specific permits to the drivers of construction site machinery and heavy vehicles;
- check trucks, their general condition, load and stowage;
- ensure that the transport of hazardous materials complies with local regulations and international specifications;
- prohibit traffic at night unless an exemption is issued by GDIZ HSE manager.

##### **Traffic regulation and management on GDIZ premises**

- determine the speed limits on GDIZ site depending on the type of road (arterial / sub arterial streets, collector roads, local roads, local access roads) and materials to be installed (traffic signs, lights, bumps, speed humps, road signs, etc.);
- present traffic regulations to drivers and the sanction system in case of non-compliance;

- conduct unannounced speed checks, control drivers regularly and penalize driving for excessive speed or drunkenness;

#### **Traffic regulation and management outside GDIZ premises**

- develop a **traffic plan applying outside GDIZ premises** presenting which public roads will be used by GDIZ vehicles, at what period of the year and expected time of the day and for what duration. This plan will detail applicable traffic regulations particularly near the villages closest to the Project site, including the type and amount of equipment to be installed, their location and speed limits to be respected;
- continue awareness-raising on road safety in the 8 villages surrounding the Project site.

#### **10.5.1.3. Waste management plan**

A solid waste management system is already planned in the Project master plan (cf. § 4.3.1.3). This system is compliant with international best practices, since it rests on a primary management of waste at the industries level, collection by GDIZ via transfer stations, composting for biodegradable waste, recycling for some waste or disposal in an authorized landfill for other waste.

#### **Some additional measures must however be taken to ensure proper waste management:**

- Ensure the effectiveness of the selective sorting and fence the composting trenches and the waste transfer centers to avoid animal intrusion and pest development.
- Appropriate and regular waste collection from industries until disposal sites by GDIZ.
- Regular control and visits of the landfill site to ensure its waste management procedures are respectful of the environment.
- Application of the World Bank Group Environmental, Health, and Safety Guidelines for the waste management facilities.

#### **Regarding the sludges produced by the wastewater treatment plants:**

- Dedicated measures will have to be defined through a dedicated ESIA for CETP and STP and these measures will have to be included in the waste management plan.
- Application of the World Bank Group Environmental, Health, and Safety Guidelines for the Water and sanitation.

#### **10.5.1.4. Occupational hygiene, health and safety of GDIZ workforce**

GDIZ workforce will have to be offered a working environment and working conditions respectful of the international best practices and Benin laws. In particular, the following measures are expected to apply to the workforce:

- Management of the workforce and working conditions in accordance with Benin's national regulations (Labor Code), IFC HSES guidelines and the ILO conventions ratified by Benin.
- Realization of job hazard assessment (JHA) and provision of personal protective equipment (PPE) available to workers and control that they are worn.
- Code of conduct, internal regulations and training of workers on the environmental and social aspects.
- Recruitment of one or several HSE coordinator in charge of monitoring the proper application of the plans.



- Provision of facilities that ensure safety and hygiene is maintained at all time on GDIZ premises, in addition to already planned police, fire fighting and health centre (cf. § 4.3.2). Such facilities are: safe access along with fire precautions and safety exits, hazardous area signage, labeling of hazardous equipment, first-aid equipment positioned in strategic location of the site, sanitary facilities (lavatories, showers) in sufficient amount for all workers (including separate facilities for females), locker rooms, clean eating areas, sufficient potable water supply, sufficient air supply and lighting, adequate work environment temperature, emergency response equipment, integrity of workplace structures, etc..

#### **10.5.1.5. Human resources management plan**

In operation phase, GDIZ will have to have clear policies and procedures in terms of human resources management. In particular, it will have to pursue the local recruitment program and the social inclusion plan.

##### **Local recruitment program**

- set up a recruitment program for local labor as a matter of priority, particularly those affected by the Project (PAPs) with equal skills;
- put in place the Stakeholder Engagement Plan (SEP) and the complaints management mechanism.

##### **Social inclusion plan**

- respect beninese national legal framework and international standards concerning gender equality and the fight against violence made to women as well as and international standards (ILO conventions) concerning PWDs and the prohibition of child labor;
- conduct regular controls to ensure no children under 14 are employed on the site;
- establish positive discriminatory measures that will promote the employment of women and vulnerable persons (involving the involve the Centers for Social Promotion) beyond jobs usually attributed to them;
- facilitate their integration on the GDIZ site by setting up infrastructures dedicated to them (toilets, bathrooms, access ramps, elevators, etc.);
- raise workers' awareness on gender equality, discrimination and violence against women and the risks of STDs and HIV/AIDS;
- condemn any form of gender-based violence or discrimination against vulnerable persons by GDIZ workers in the Code of Conduct and plan disciplinary measures for offenders;
- plan for a grievance mechanism adapted to the reception and treatment of gender-based violence.

#### **10.5.1.6. Cultural heritage management**

During operation phase, if the forest is still in the Project footprint, it will be fenced off (with green hedges) and a fenced access path will remain available for villagers to access it anytime. GDIZ will be responsible for the protection of the forest at all times.

GDIZ and industries personnel will be informed about the presence of the forest and the rules governing it. They will be prohibited from entering the forest and information boards will be set up around the forest to remind its nature and sacred characteristics.

#### 10.5.1.7. Maintenance plan for common outdoor areas

##### Electrical substations

- Routine maintenance checks will be undertaken regarding electric substations and emergency generators, especially for the equipment using SF6 gas that must be checked properly and periodically in accordance to the specification and operation manuals.
- As there is no available alternative to ban SF6, the judicious use of SF6 with careful closed-loop handling and full recycling upon equipment retirement must be privileged.
- Application of the decree n°2001-110 of 4 April 2001 relating to the atmospheric emissions of fixed sources.
- Acoustically isolate the electrical substation.

##### Green spaces

- Set up of green hedges for GDIZ and sacred forest perimeter instead of protection grating or any other material that could prevent small animals to pass. If not possible, plan some gaps between the ground and the bottom of the wall. Note that green hedges will be better for the GDIZ landscaping integration than a wall
- Use of pesticides shall be prohibited. Mechanical method for green spaces maintenance shall be privileged.
- Open green spaces maintenance operations will begin after planting. Planting beds will be kept free of weed, grass and other undesired vegetation growth. In general, maintenance of all spaces under the GDIZ responsibilities has to be managed appropriately.

#### 10.5.1.8. Site emergency response plan

GDIZ will have to develop an emergency plan in case of accidental spillage or other kind of accident on site as:

- small incidents such as minor spillages or individual incidents resulting in minor harm;
- large incidents major spillages or failure of control equipment that could result in offsite impacts or severe injuries or even fatalities;
- fires or explosions; or
- release of toxic gases or substances.

All the measures detailed in section 8.2 have to be included and developed in the emergency plan whose content is outlined in 8.2.2.2.2. Measures from the hazard studies (see section 10.3.2.2.1) should also be included.

This site emergency response plan must be developed in collaboration with the other industrials and communicated to neighboring communities and appropriate stakeholders.

The services of the ANPC (National agency for civil protection) should be solicited and put through with the fire station on site. A dedicated communication has to be established between the ANPC and GDIZ.

GDIZ will also have to organize with all stakeholders several emergency drills once a year. Third parties such as local authorities, local communities, the police and fire fighting services at Atlantic Department level shall be involved.

#### 10.5.1.9. Monitoring procedures

The GDIZ E&S department shall conduct regular monitoring on the GDIZ infrastructures but also on the industrial plants. The monitoring could be on documentation basis provided by the industries management or on punctual measurements and samplings performed by the GDIZ E&S department.

Monitoring will include:

- monitor industrial operators' compliance with the GDIZ Operational Guidelines, IFC standards and national requirements (the most restrictive) on atmospheric emissions, noise levels, water discharges, waste management;
- monitor GDIZ common infrastructures' compliance with the GDIZ Operational Guidelines, IFC standards and national requirements (the most restrictive) on water discharges, waste management (**waste tracking and register**), product consumption (**water, energy**).

More specifically, **regarding water discharges** the monitoring should take as references the values of the Beninese regulations and in case of unavailability in these regulations, the values of the WHO or any other internationally recognized standard to define the non-compliance of discharges. In particular, and at a minimum, the following bacteriological and physico-chemical indicators will be monitored monthly:

- CETP/STP: total coliforms, BOD5, COD, Total nitrogen, total phosphorus, pH, suspended solids,
- Hydrocarbon separators: total hydrocarbons or oil and grease;
- Central drain: all above indicators.
- monitor GDIZ common infrastructures' compliance with the GDIZ Operational Guidelines, IFC standards and national requirements (the most restrictive) on atmospheric emissions and noise levels, if required (depending on complaints and observations);
- maintenance checks for hazardous machines and facilities (once in every quarter or as given in supplier's specifications);
- monitoring of all indicators as described in 10.7.6.

Regarding to GDIZ activities, it is not expected to perform noise and air monitoring. Nevertheless, if audits or complaints raised issues, appropriate measures should be set up.

### 10.5.2. GDIZ environmental and social guidelines for industries

In operation phase, GDIZ will develop its Operating Guidelines, containing environmental and social requirements applicable to all industries wishing to set up on the site.

These guidelines will have to include the following:

- Clauses on the local recruitment program and human resources management.
- Clauses on positive discriminatory measures and non-discrimination of women and vulnerable persons.
- Clauses on Occupational hygiene, health and safety of workers in line with ARISE's Minimum OHS Standards for Construction Contracts.
- Clauses on environmental impact assessment for future industries whose process requires it. The study must be provided to GDIZ E&S department before the delivery of operating permit.
- Clauses on hazard study (preliminary risk assessment / hazard identification, reduction of potential hazard, accident scenarios and consequences analysis, dominos effects) including the definition of appropriate safety measures must be conducted for the future industries

whose process requires it (involving storage silos or process with combustible or explosives). For all installations whose hazardous phenomena have effects outside the site, a detailed risk assessment will be carried out. Bow-tie (integrating fault tree and event tree) will be used for determining the probability of each residual dangerous phenomenon. The operator will have the responsibility to conduct this kind of study, take appropriate decisions based on the results of the study and share it with GDIZ.

- Request for industries to develop the following plans compliant with GDIZ operating guidelines and the IFC Environmental, Health, and Safety Guidelines for the concerned industry sector:
  - water resource management and discharge monitoring plan: water consumption must be monitored and depending on the process, a preliminary water treatment must be set up. Effluents quality will be monitored;
  - air emissions and noise management plan, including vehicles speed limit, use of vehicles and engines in good condition and respect of working hours;
  - waste management plan: contractual obligations for the primary waste collection;
  - light management;
  - hazardous products management plan;
  - drivers and vehicle fleet management;
  - a safety management plan for identifying all hazards associated with the activity in question (based on results of the risks assessment, if the process requires it). A hazard in this context is defined as any aspect of the Project activities which could result in harm to onsite personnel. These may include some of the following: non-ionizing radiation, heat, noise, confined spaces, electrical hazards, fire and explosion hazards, chemical hazards and dust.

Each hazard will then be assigned a risk level based on the likelihood and severity of the consequence of exposure. Depending on the assigned level of risk appropriate mitigation measures will be proposed to eliminate, control or minimise the risks associated with each hazard. It shall be each industrial unit's responsibility to ensure these measures are undertaken and implemented.

## 10.6. ESMP summary table

The table below presents, for each impact of the Project, the proposed mitigation measures, the associated management plan, the implementation planning, the responsible for implementation and monitoring as well as the budget responsibility.

### 10.6.1. Preparation phase

Table 49 ESMP summary for preparation phase

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget responsibility
				Development	Implementation	Monitoring	
-Destruction of habitat by removal of vegetation leading in destruction of flora and injuries/death for animals -Soil erosion due to removal of vegetation -Water pollution due to proximity of the storage area with sensitive areas	<p><b>Soil</b></p> <ul style="list-style-type: none"> <li>-Preferentially locate work areas and base camp on flat areas to reduce topographical alterations</li> <li>-Locate work areas and base camp as close as possible to the GDIZ areas in view to reduce the sector affected by an access road</li> <li>- Ensure rehabilitation of all affected area at the end of the works</li> </ul> <p><b>Water</b></p> <p>Preferentially locate engine washing areas, hazardous products storage area and waste storage area away from local boreholes and wells in order to limit the risk of accidental contamination</p> <p><b>Vegetation</b></p> <ul style="list-style-type: none"> <li>-Minimise bush clearing areas by maximising usage of existing cleared areas</li> <li>- Draw up a procedure for bush clearing with preferred brush cutting method (manual brush cutting)</li> </ul>	Provision for location of the main contractor work area	Preparation	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
Physical displacement of around 50 buildings	<b>Develop and implement a Resettlement Action Plan (RAP) including Livelihood Restoration Plan in line with</b>	Resettlement Action Plan	Preparation	GDIZ	GDIZ	GDIZ ABE	GDIZ

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget responsibility
				Development	Implementation	Monitoring	
Economic displacement of an estimate of 3,000 persons	<b>IFC standards</b> -Define an entitlement matrix that is inclusive of presumed owners and land users -Compensate preferably in-kind landowners holding land titles and presumed owners, as well as land tenants and other users -Set up a re-housing programme for households losing their principal residence -Implement a recruitment program targeting PAP in priority; -Establish livelihood restoration programs for households losing their income sources.						
Exclusion of women from compensation processes and decision-making processes related to physical and economic displacement	<b>Measures to be included in the RAP:</b> -Establish measures to identify and compensate women land owners or users -Set up measures to identify and assist households with vulnerable persons -Stagger compensation payments over a minimum of 2 periods -Include representatives of women and vulnerable persons in the RAP monitoring committee	Resettlement Action Plan	Preparation	GDIZ	GDIZ	GDIZ ABE	GDIZ
Difficulties for vulnerable groups to find alternate livelihood sources following physical and economic displacement because of poverty, stigmatization and discrimination							



Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget responsibility
				Development	Implementation	Monitoring	
Destruction of sacred forest of Anavie and of individual sites sheltering Vodouns deities in the Project area	<ul style="list-style-type: none"> <li>-Revise the Project design to exclude the forest from the projet footprint</li> <li>-If not technically feasible, preserve the forest as it is and integrate it fully into the Project design: fence it off and include in the design a small pathway for villagers</li> <li>-Organize rituals and ceremonies with traditional authorities and religious leaders in order to comply with local cultural practices</li> </ul>	Cultural Heritage Management Plan	Preparation	GDIZ	GDIZ	GDIZ ABE	GDIZ

## 10.6.2. Construction phase

Table 50 ESMP summary for construction phase

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Development	Implementation	Monitoring	
Smoke and greenhouse gas emissions from construction machineries, compressors and electricity generators and green waste burning	-Waste reuse, composting and recycling. -Burning waste is strictly forbidden	Waste management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
	Use of good quality equipment and vehicles / regular inspection and maintenance.	Air and noise emission management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
Dust emissions earthmoving operations, storage of excavated materials and products, material crushing units and the concrete plant. During dry period this impact is higher	Limit the vehicles speed in inhabited area (30 km/h)	Traffic and road safety plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
	-Humidification of roads / soil stored when necessary -Covering trucks transporting pulverulent materials -Dust monitoring	Air and noise emission management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
- Earthworks, concrete and asphalts fabrication, construction activities & traffic will be the main source of noise - Project location in an area where activities generating noise are low : increase of level of noise compared to the baseline conditions	-Limit construction works to daytime hours where reasonable and feasible -Using equipment that has been well maintained -Construct physical noise barriers around main the main source of noise -Transportation vehicles should maintain appropriate travelling speeds -Noise monitoring on a quaterly basis	Air and noise emission management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Development	Implementation	Monitoring	
Wastewater discharges/waste leachate into groundwater and surface water (mainly suspended solids, organic matter and bacteria). Discharges causing a deterioration in the quality of the natural environment (lack of oxygen, turbidity)	-Implementation of wastewater treatment systems -Water quality monitoring program from worksite areas	Water resources and discharges management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
-Impact both on the environment but also on public health with the risk of epidemic development -Impact on surface water is limited because of no presence of sensitive aquatic ecosystem	Implementation of collection, monitoring and waste treatment plan	Waste management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
-Release into groundwater from washing water of engines and equipments - including asphalt plant and concrete mixer (lack of oxygen, turbidity, chemical pollution) -Impact on surface water is limited because of no presence of sensitive aquatic ecosystem	-Identification of appropriate place for chemicals and dangerous products storage -Appropriate storage for dangerous products -Identification of appropriate place for engine refuelling, maintenance and washing	Hazardous products and spills management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
-Potential risk of leaks and accidental spillage of hazardous products (hydrocarbons, chemicals, hazardous waste, etc.) on the ground: contamination of groundwater by infiltration	Develop an emergency plan in case of accidental spillage	Hazardous products and spills management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Development	Implementation	Monitoring	
-Significant risk to human health in the event of consumption of polluted water; acute toxicity to aquatic life							
Heavy rainfall on poorly cohesive materials increased water turbidity following runoff on bare soil. Soil leaching can go until the Lama river through the longitudinal depression, but no hydraulic connexion was observed during the rainy season	Stripped soil management Main excavation work shall be conducted during dry periods	Erosion and soil management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
Concrete production, vehicles washing, tracks humidification and domestic use, etc will consume water, around 31 680 m <sup>3</sup> for the overall works activities.	Water supply with bottle and tank with rainwater collection (linked to a rainwater collection system)	Water resources and discharges management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
-Land clearing, earthworks and soil storage: can disturb the initial hydraulic patterns and . -Impact limited because of the main scheme of hydraulic patterns will be maintained.	Selection of porous asphalt	Water resources and discharges management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Development	Implementation	Monitoring	
-Impacts on soil quality and groundwater of unconfined aquifer (indirect impact)	See above measures regarding water quality.	Water resources and discharges management plan	Construction	Main contractor	Main contractor & subc.	GDIZABE	Under main contractor contract
-Large volumes of non-reusable excavation products will be stored permanently, which could lead to landslides causing erosion and sedimentation -Temporary soil disturbance on base & work camps	-Stripped soil management -Optimization of cut and fill -Implementation of silt fence -Progressive soil rehabilitation	Erosion and soil management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
Visual degradation in case of poor management of the site perimeter / work base / base camp perimeters	Implementation of collection, monitoring and waste treatment plan	Waste management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
-Production of domestic waste (0,88 m³/d), green waste (1,441,63 ha to be cleared), inert waste and dangerous waste from work area and base camp -Possible impacts come from poor waste management, especially for domestic and hazardous waste, and the burning of green waste	Act with the Government, the need to develop a landfill site in close vicinity of the site or to expand the existing landfill. If new landfill, ensure the government planned a dedicated ESIA.	Waste management plan	Construction	GDIZ	Gouvernement	Gouvernement / GDIZ	Under Government responsibilities
	Identify recognized Beninese companies in order to regularly collect and treat recyclable and specific waste (hazardous).	Waste management plan	Construction	GDIZ	GDIZ	ABE DDLESD – ALD	GDIZ

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Development	Implementation	Monitoring	
	-Implementation of collection, monitoring and waste treatment plan -Submit a request for waste transport to Authorities	Waste management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE DDLESD – ALD	Under main contractor contract
Agricultural formations and bare soil are the most impacted area by the Project with 1,450 ha, or 99% of the area. Natural vegetation only occurs on 11,7 Ha Area impacted by the Project are highly affected by human activities and present no major ecologic sensitive issues	-Implement before the clearing operations a plant nursery -Selection indigenous and native flowering plants and ornamental trees -Recruit a forestry expert to support the revegetalisation program and the GDIZ green spaces -Submit a request for land clearing permit to Authorities  -Limit clearing activities and clearly mark the rights-of-way. -Prohibit the movement of soil and material from one region to another.  -Exclude the sacred forest by fencing in order to preserve it Clean the engine to ensure the absence of invasive plants -Revegetation of works rights-of-way using only		Preparation Construction	Forestry expert	GDIZ	ABE DDLESD – ALD	GDIZ
Loss of : * Terrestrial modified habitat: 1.450,3 ha, or 99,2% of the Project area: no ecologic values and common in the area * Terrestrial natural habitat (including a temporary pond during the rainy season): 11,7 ha, or 0,8% of the Project area: medium ecologic diversity, especially in the sacred forest, also affected by human perturbation			Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
Clearing activities on site: loss of the 156 species recorded during dry and rainy season with no endemic or critical habitat indicator species			Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract



Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Development	Implementation	Monitoring	
2 species VU in global IUCN red list, and 1 VU & 1 EN in Benin IUCN red list → <i>Triplochiton scleroxylon</i> observed in the sacred forest. Large distribution but issues at Benin level because of anthropogenic pressures Several species already observed on site. he consequences of the introduction of invasive species vary depending on the species introduced and the ability of the environment to regulate them	species naturally present in Benin -Cover the temporary storage of excavated soil with a waterproof geotextile to limit the development of invasive species						
Conversion of a few hectares of forest and shrubland into a modified zone is not likely to modify the populations of mobile fauna which have not saturated its environment. Several species of birds and mammals protected by the national regulation were observed, but none has a IUCN status higher than LC status. Several clues indicate that the site is a nesting area for several bird species, including ground-nesting birds.	Carry out clearing activities outside the rainy season		Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Development	Implementation	Monitoring	
Additional significant anthropic pressure can be observed on bushmeat or on useful wood species as energy sources and building materials and the need for farmland (new land to be cleared) Impact limited for bushmeat due to their limited presence	-Formally prohibit hunting for all employees-Formally prohibit the consumption of bushmeat	Code of conduct for workers	Construction	Main contractor	Main contractor & subc.	GDIZABE	Under main contractor contract
-Employment and contracting during the construction phase, bringing job creation and reducing unemployment rates -Boost to the local economy through the increased consumption by site workers and contractors of goods and services produced by local companies	-Set up a recruitment program for local labor as a matter of priority, particularly those affected by the Project (PAPs) with equal skills -Whenever possible (locally available and financially competitive) give priority to hiring local subcontractors coming from municipalities of Tori-Bossito and Ze	Human resources management	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
	-Include clauses on local recruitment, local sub-contracting and transfer of skills with local companies in the Tender Documents for the works -Implement the Stakeholder Engagement Plan (SEP) and the complaint management mechanism	Environmental and social specifications for the main contractor and its subcontractor  Stakeholder Engagement Plan	Preparation Construction	GDIZ	GDIZ	GDIZ ABE	GDIZ

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Development	Implementation	Monitoring	
<p>-Potential damages to the sacred forest of Anavie during the works</p> <p>-Damages to potential archeological artefacts buried in the soil during excavation and soil works</p>	<p>-Marking of the forest limits with clear markers (red ribbon or any other means deemed suitable) to prevent damages to the forest. Marking will have to be done in collaboration with Anavie village authorities to ensure it is correctly performed</p> <p>-Prohibiting the use of bulldozer to proceed with tree cutting and vegetation removal at less than 30 meters from the sacred forest;</p> <p>-Awareness-raising to all workers including subcontractors' workers, especially drivers of construction engines, about the presence of the forest and cultural rules governing it</p> <p>-Arranging of a safe passage that must be left accessible during the works to villagers wishing to go into the forest</p> <p>-Setting up a chance-find procedure in relation to potential archeological findings</p>	Cultural Heritage Management Plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Development	Implementation	Monitoring	
Project-induced in-migrations, attracting rural migrants and urban youth from the municipalities of Tori-Bossito and Ze but also from the whole Atlantic Department (Cotonou, Allada, Ouidah, etc.) in the search for daily jobs	-Develop a communication plan and an information campaign on real job opportunities to reduce opportunistic immigration -Monitor the settlement of newcomers in the 8 villages in the study area with the village chiefs who will record the number of new arrivals -Implement a price monitoring of a basket of local commodities in order to identify any inflation tendency -Monitor the health status of the population, food and water resources availability and the level of overloading of other public infrastructure through regular interviews with targeted stakeholders <b>Compensation:</b> -Targeted programme to strengthen water supply infrastructure (through donations to adequate authorities or building of new infrastructures) in coordination with local authorities -Support to public health centres of Tori-Cada and Tangbo-Djevie through a donation of material	Social influx management plan	Preparation Construction	GDIZ	GDIZ	GDIZ ABE	GDIZ
	Prohibit recruitment at the gate(s) of the construction site and set up one or several a decentralized recruitment office	Social influx management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Development	Implementation	Monitoring	
-Limited access to employment opportunities restricted to jobs traditionally attributed to women (cook, cleaning lady, etc.)-Exposure to sexual harassment by the site workers outside the site or on the site perimeter for female workers-Exposure to increased domestic violence due to increased alcohol consumption due to stress or social ills brought by the Project-Encouragement to prostitute oneself due to solicitation or economic necessity-Exclusion from village decision-making processes related to the Project	-Respect Beninese national legal framework and international standards concerning gender equality and the fight against violence made to women-Establish positive discriminatory measures that will promote the employment of women on the construction site beyond jobs usually attributed to them-Facilitate women integration on the construction site by setting up infrastructures dedicated to them-Raise workers' awareness of gender equality, discrimination and violence against women-Condemn any form of gender-based violence by site workers in the Code of Conduct and plan disciplinary measures for offenders	Social inclusion plan	Construction	Main contractor	Main contractor & subc.	GDIZABE	Under main contractor contract
	-Implement a grievance mechanism adapted to the reception and treatment of gender-based violence -Include women's representatives in the monitoring committee of the ESMP	Social inclusion plan  Stakeholder engagement plan	Construction	GDIZ	GDIZ	GDIZ ABE	GDIZ

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Development	Implementation	Monitoring	
-Limited access to the job opportunities created by the Project -Risks of degrading treatment in terms of harassment, verbal and physical violence -Exploitation of children under the age of 14	-Respect Beninese national regulations and international standards (ILO conventions) concerning PWDs and the prohibition of child labor -Establish positive discriminatory measures that will encourage the recruitment of PWDs for jobs that are suited to their abilities -Facilitate PWDs integration on the construction site by setting up infrastructures dedicated to them -Conduct regular controls to ensure no children under 14 are employed on the construction site -Raise awareness among workers on the rights of vulnerable persons in the Code of Conduct -Condemn any form of discrimination against vulnerable persons by site workers in the Code of Conduct and plan disciplinary measures for offenders	Social inclusion plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
	Include vulnerable persons representatives in the monitoring committee of the ESMP	Social inclusion plan	Construction	GDIZ	GDIZ	GDIZ ABE	GDIZ
Exposure of construction site workers to accidents and diseases caused by various factors	-Manage the workforce and ensure working conditions in accordance with Benin's national regulations (Labor Code) and the ILO conventions ratified by Benin -Make personal protective equipment (PPE) available to workers and ensure that they are worn -Set up and implement a Waste Management Plan and a Hazardous Products Management Plan -Set up and implement a Traffic and Road Safety Plan -Set up and implement an Occupational Hygiene, Health and Safety Plan -Recruit one or several HSE coordinator in charge of monitoring the proper application of the plans	Occupational Hygiene, Health and Safety Plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract



Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Development	Implementation	Monitoring	
	<ul style="list-style-type: none"> <li>-Include clauses on HSE requirements in the Tender Documents for the works with obligations applying to contractors and their subcontractors</li> <li>-Implement the Stakeholder Engagement Plan (SEP) and the complaint management mechanism with a dedicated mechanism for construction workers</li> </ul>	<p>Environmental and social specifications for the main contractor and its subcontractor</p> <p>Stakeholder engagement plan</p>	Construction	GDIZ	GDIZ	GDIZ ABE	GDIZ
<p>Exposure of local community members to accidents and diseases caused by the presence of the construction site:</p> <ul style="list-style-type: none"> <li>- Road accidents</li> <li>- Accidents due to site trespassing</li> <li>- Use of excessive force by site security personnel</li> <li>- Exposure to communicable diseases, especially STDs and HIV/Aids</li> <li>- Exposure to unhealthy environment due to hygiene practices on the construction site</li> </ul>	<ul style="list-style-type: none"> <li>-Set up a Traffic and Road Safety Plan that considers local communities</li> <li>-Set up and implement Occupational Hygiene, Health and Safety Plan</li> <li>-Deploy a 24/7 guard system for the various work zones;</li> <li>Implement site access controls (badges with identification) with one or more vehicle checkpoints</li> <li>-Set up and implement a Security personnel management plan</li> </ul>	<p>Occupational Hygiene, Health and Safety Plan</p> <p>Traffic and Road Safety Plan</p>	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
	<ul style="list-style-type: none"> <li>-Deploy an awareness program for villagers on road risks and the safety measures required-Organize awareness campaigns in villages in the study area on basic hygiene measures to be respected-Set up a programme to raise awareness among the local population of the risks of contamination by STDs and HIV/Aids through an NGO with expertise in the field</li> </ul>	Community Health and Safety Plan	Construction	GDIZ	GDIZ	GDIZABE	GDIZ

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Development	Implementation	Monitoring	
Nuisances caused by air emissions and noise affecting the populations living in the vicinity of the construction site, particularly those in the villages of Agbodjedo, Djitin-Aga and Anavie, which are the closest to the construction site	<ul style="list-style-type: none"> <li>-Locate working zones (workshops) far from houses and villages</li> <li>-Avoid noisy work during off-duty hours</li> <li>-Limit the speed of trucks to 30 km/h in all populated areas;</li> <li>-Use good quality vehicles, preferably new, with engines in good condition</li> <li>-Work with equipment that meets the required standards in terms of noise emissions</li> </ul>	Air and noise emission management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract
Water consumption for works, mainly for washing vehicles and construction equipment and for human consumption	Water supply with bottle and tank with rainwater collection (linked to a rainwater collection system)	Water resources and discharges management plan	Construction	Main contractor	Main contractor & subc.	GDIZ ABE	Under main contractor contract

### 10.6.3. Operation phase

Table 51 ESMP summary for operation phase

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Plan development	Implementation	Monitoring	
-Smoke and greenhouse gas emissions from substations and emergency generators -Large part of the vehicle fleet is not under GDIZ responsibility	-Routine maintenance checks -Careful closed-loop handling and full SF6 recycling upon equipment retirement -Application of the decree n°2001-110 of 4 April 2001	Maintenance plan for common electrical infrastructures	Exploitation	GDIZ	GDIZ	GDIZ ABE Lenders	GDIZ
Specific emissions from the future industrial unit	Assess the impacts resulting from their discharges in a dedicated ESIA Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector	Contractual specifications for the future industries	Exploitation	GDIZ	Industries	GDIZ ABE Lenders	Industries
Future industrial unit can cause noise emissions.	-Assess the impacts resulting from their noise emission in a dedicated ESIA -Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector	Contractual specifications for the future industries	Exploitation	GDIZ	Industries	GDIZ ABE Lenders	Industries
Main source of noise will come from traffic.	Speed limit in line with the road's classification	Traffic and road safety plan	Exploitation	GDIZ	GDIZ Industries	GDIZ ABE Lenders	GDIZ
GDIZ common utilities are not expected to create noise emissions, except electrical substations which are located far away from residential area	Acoustically isolate the electrical substation	Maintenance plan for common electrical infrastructures	Exploitation	GDIZ	GDIZ	GDIZ ABE Lenders	GDIZ

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Plan development	Implementation	Monitoring	
Stormwater from area that can be lixiviated, producing contaminated water.	-Stormwater from areas with oily process operations will be drained through oil interceptors before being discharged -Each outfall location must be equipped with grates or nets to arrest the debris	Water resources and discharges management plan	Exploitation	GDIZ	GDIZ	GDIZ ABE Lenders	GDIZ
It is expected that 10,336.89 m <sup>3</sup> of treated effluent will be discharged in the central drain per day. Initial effluents will have various quality level depending on their source (industrial or domestic).	-Implementation of preliminary treatment at industrial plot level -Monitoring of all liquids effluents discharges in the environment	Contractual specifications for the future industrials	Exploitation	GDIZ	Industries	GDIZ ABE Lenders	Industries
	-Monitoring of all liquids effluents discharges in the environment	Water resources and discharges management plan	Exploitation	GDIZ	GDIZ Industries	GDIZ ABE Lenders	GDIZ Industries
-Discharges in dried drain without possibility of dilution for the treated effluents. -High risk of standing water implying nuisances (odour), potential pollution and development of disease vectors	-Definition, for all industrial units, of effluent requirements to be accepted in the CETP -Obligation to fulfil a dedicated ESIA for the treatment plants -Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector, especially the one for Water and sanitation -Obtain an operating permit for wastewater discharges	Additional studies	Exploitation	GDIZ	GDIZ	GDIZ ABE Lenders	GDIZ
Accidental events could lead to an accidental spillage of hazardous products or a release of untreated wastewater	Development of an emergency plan in case of accidental spillage	Emergency plan	Exploitation	GDIZ	GDIZ Industries	GDIZ ABE Lenders	GDIZ Industries

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Plan development	Implementation	Monitoring	
-Need of 18,000 m <sup>3</sup> per day (industrial, commercial and residential uses) -Aquifer capacity and potential concurrency with the other uses are unknown	Develop a hydrogeological study including an exploitation modelling on the resources	Additional studies	Exploitation	GDIZ	GDIZ	GDIZ ABE Lenders	GDIZ
Drilling of boreholes to feed the supply network	-Obtain an operating permit for groundwater withdrawal and drilling -Perform dedicated EIA for drilling under Beninese regulation -Assess and managed drilling activities	Additional studies	Exploitation	GDIZ	GDIZ	GDIZ ABE Lenders	GDIZ
Need for GDIZ around 18,000 m <sup>3</sup> per day	Water consumption monitoring for the entire GDIZ	Water resources and discharges management plan	Exploitation	GDIZ	GDIZ Industries	GDIZ ABE Lenders	GDIZ
GDIZ will not disturb the natural hydraulic scheme of the area. But large soil sealing will increase superficial runoff and the water volume in the central depression that can causes flooding downstream	-Conduct hydraulic study -Develop and implement design concept to reduce runoff volume. -Discuss with the government for the overall stormwater management of the area	Additional studies	Exploitation	GDIZ	GDIZ Govt of Benin	GDIZ ABE Lenders	GDIZ Govt of Benin
-Presence of GDIZ will limit animal movements, including in the sacred forest -Ecologic value of these place has largely decrease the last years because of the frequentation of the forest by men and the increase of surroundings crops that have delete mostly of the displacement corridors and	Implementation of green hedges for GDIZ and sacred forest perimeter, or if a wall, plan some gaps between the ground and the bottom of the wall	Maintenance plan for common outdoor areas	Exploitation	GDIZ	GDIZ	GDIZ ABE Lenders	GDIZ

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Plan development	Implementation	Monitoring	
gene flow reducing faunistic diversity							
-Injuries and death of animals that are attracted by organic waste -Development of pests attracted by accessible organic waste	Ensure an effectiveness selective sorting & fence the composting trenches and the waste transfer centers	Waste management plan	Exploitation	GDIZ	GDIZ	GDIZ ABE Lenders	GDIZ
Flooding and contamination of habitats downstream the area in case of disturbance in the management of several infrastructures / activities (runoff from waste storage, stagnant water in the central drain, discharges from the wastewater treatment plants or industrial unit)	See above measures regarding water quality	-	Exploitation	GDIZ	GDIZ Industries	GDIZ ABE Lenders	GDIZ Industries
Impacts on soil quality in case of disturbance in the management of several infrastructures / activities (runoff from waste storage, stagnant water in the central drain, discharges from the wastewater treatment plants)	See above measures regarding water quality	-	Exploitation	GDIZ	GDIZ Industries	GDIZ ABE Lenders	GDIZ Industries
Specific discharges from the future industrial unit	-Assess the impacts resulting from their discharges in a dedicated ESIA -Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector	Contractual specifications for the future industrials	Exploitation	GDIZ	Industries	GDIZ ABE Lenders	Industries
Environmental degradation in case of use of chemical products	Use of pesticides shall be prohibited. Mechanical method for green spaces maintenance shall be privileged	Maintenance plan for common outdoor areas	Exploitation	GDIZ	GDIZ Industries	GDIZ ABE Lenders	GDIZ Industries



Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Plan development	Implementation	Monitoring	
-Large change in land uses and landscape lead in significant visual impact however limited by the natural screening from vegetation and in the absence of touristic area -The Project aims to develop around 150 ha of green spaces with indigenous plants and trees.	Open green spaces maintenance operations	Maintenance plan for common outdoor areas	Exploitation	GDIZ	GDIZ Industries	GDIZ ABE Lenders	GDIZ Industries
Large lighting during the night will be observed in places initially lightly lighted	Appropriate light management at night time	Contractual specifications for the future industrials	Exploitation	GDIZ	GDIZ Industries	GDIZ ABE Lenders	GDIZ Industries
Production of 53.67 Tons per day with 45% of Bio-degradable waste (organic in nature), 40% of non-biodegradable and 15% of inert waste Possible impacts if inappropriately managed	Contractual specifications for future industrial: contractual obligations for the primary collection of waste	Contractual specifications for the future industrials	Exploitation	GDIZ	Industries	GDIZ ABE Lenders	Industries
Selection of landfill under Govt. Responsibility	-Assess the impacts resulting from this new landfill in a dedicated ESIA -Obtain an operating permit for waste disposal in a landfill	Additional studies	Exploitation	GDIZ	GDIZ Govt of Benin	GDIZ ABE Lenders	Govt of Benin

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Plan development	Implementation	Monitoring	
Specific waste to be managed, including those from the wastewater treatment plant	<ul style="list-style-type: none"> <li>-Waste management plan for waste collected from industries until disposal sites for GDIZ</li> <li>-Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector, especially the one for waste management facilities</li> <li>-Sludge from wastewater treatment plants: measures to be defined through making a dedicated ESIA and to be included in the waste management plan</li> <li>-Application of the World Bank Group Environmental, Health, and Safety Guidelines for the industry sector, especially the one for Water and sanitation</li> </ul>	Waste management plan	Exploitation	GDIZ	GDIZ	GDIZ ABE Lenders	GDIZ
Discharge of excess water from the central drain into the natural environment causing inundations to the crops and houses and water stagnation in the area creating an unhealthy environment with a proliferation of mosquitoes increasing malaria prevalence among villagers	<ul style="list-style-type: none"> <li>-Ensure the Government will provide with a solution so that GDIZ waters are discharged up to the Lama depression</li> <li>-Compensate land owners, farmers and building owners for the damages caused to their assets by the flooding</li> <li>-Find a permanent solution to prevent flooding from occurring again (in the absence of action by the Government)</li> </ul>	Water resources and discharges management plan	Exploitation	GDIZ Govt of Benin	GDIZ Govt of Benin	GDIZ ABE Lenders	GDIZ Govt of Benin
Creation of around 12,000 jobs on GDIZ	<ul style="list-style-type: none"> <li>-Set up a recruitment program for local labor for GDIZ operations as a matter of priority, particularly those affected by the Project (PAPs) with equal skills;</li> <li>-Include clauses on the local recruitment program in the GDIZ operating guidelines</li> <li>-Monitor industrial operators' compliance with the GDIZ operating Guidelines</li> <li>-Put in place the Stakeholder Engagement Plan (SEP) and the complaints management mechanism</li> </ul>	Human resources management  Stakeholder engagement plan	Exploitation	GDIZ	GDIZ Industries	GDIZ ABE Lenders	GDIZ

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Plan development	Implementation	Monitoring	
-Limited access to the job opportunities created by the Project -Risks of degrading treatment in terms of harassment, verbal and physical violence -Exploitation of children under the age of 14	-Include clauses on positive discriminatory measures and non-discrimination of women and vulnerable persons in the GDIZ operating guidelines -Monitor industrial operators' compliance with the GDIZ operating Guidelines -Respect Beninese national legal framework and international standards concerning gender equality and the fight against violence made to women as well as and international standards (ILO conventions) concerning PWDs and the prohibition of child labor -Conduct regular controls to ensure no children under 14 are employed on the site -Establish positive discriminatory measures that will promote the employment of women and vulnerable persons (involving the involve the Centers for Social Promotion) beyond jobs usually attributed to them -Facilitate their integration on the GDIZ site by setting up infrastructures dedicated to them -Raise workers' awareness on gender equality, discrimination and violence against women and the risks of STDs and HIV/AIDS -Condemn any form of gender-based violence or discrimination against vulnerable persons by GDIZ workers in the Code of -Conduct and plan disciplinary measures for offenders -Implement a grievance mechanism adapted to the reception and treatment of gender-based violence	Human resources management	Exploitation	GDIZ	GDIZ Industries	GDIZ ABE Lenders	GDIZ

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Plan development	Implementation	Monitoring	
Exposure of workers to accidents and diseases caused by various factors	<ul style="list-style-type: none"> <li>-Include clauses on Occupation hygiene, health and safety of workers in the GDIZ operating guidelines</li> <li>-Monitor industrial operators' compliance with the GDIZ operating Guidelines</li> <li>-Make PPE available for workers and ensure their effective wearing</li> <li>-Set up and implement a Waste Management Plan;</li> <li>-Set up and implement a Traffic and Road Safety Plan;</li> <li>-Set up and implement an Occupational Hygiene, Health and Safety Plan;</li> <li>-Recruit an HSE coordinator in charge of monitoring the correct application of the plans;</li> <li>-Manage the workforce and ensure working conditions in accordance with Benin's national regulations and the ILO conventions ratified by Benin</li> </ul>	Occupational Hygiene, Health and Safety Plan	Exploitation	GDIZ	GDIZ Industries	GDIZ ABE Lenders	GDIZ
Exposure of local community members to accidents and diseases caused by various factors	<ul style="list-style-type: none"> <li>-Develop an emergency plan in case of accidental spillage or other kind of accident on site</li> <li>-Continue awareness-raising on road safety in the 8 villages surrounding the Project site</li> </ul>	Emergency plan Traffic and road safety plan	Exploitation	GDIZ	GDIZ	GDIZ ABE Lenders	GDIZ
	<ul style="list-style-type: none"> <li>-Realize environmental impact assessment (EIA) for future industries whose process requires it</li> <li>-Realize hazard assessment studies for future industries whose process requires it (involving storage silos or process with combustible or explosives)</li> </ul>	Contractual specifications for the future industrials	Exploitation	GDIZ	Industries	GDIZ ABE Lenders	GDIZ

Description of the potential impact	Mitigation measure	Management plan	Implementation phase	Responsibilities			Budget
				Plan development	Implementation	Monitoring	
Nuisances caused by air emissions and noise affecting the populations living in the vicinity of the construction site, particularly those in the villages of Agbodjedo, Djitin-Aga and Anavie, which are the closest to GDIZ boundaries	<ul style="list-style-type: none"> <li>-Include clauses on air quality and noise in the GDIZ operating guidelines</li> <li>-Monitor industrial operators' compliance with the GDIZ operating Guidelines</li> <li>-Avoid noisy work during off-duty hours</li> <li>-Limit the speed of trucks to 30 km/h in all populated areas</li> <li>-Use good quality vehicles, preferably new, with engines in good condition</li> <li>-Work with equipment that meets the required standards in terms of noise emissions</li> </ul>	Contractual specifications for the future industrials	Exploitation	GDIZ	Industries	GDIZ ABE Lenders	GDIZ
Reduction of water resources available for the local communities	<ul style="list-style-type: none"> <li>-Regularly assess the efficiency of the various hydraulic systems in the 8 villages of the study area through interviews with the head of villages.</li> </ul> <p><b><u>Compensation:</u></b></p> <ul style="list-style-type: none"> <li>-Build additional village hydraulic systems should the water flow reduce or stop on existing ones.</li> </ul>	Water resources and discharges management plan	Exploitation	GDIZ	GDIZ	GDIZ ABE Lenders	GDIZ

## 10.7. Monitoring and review procedure

The promoter will be in charge of **developing and communicating to the main contractor and future industrials** its procedures related to the monitoring, review and auditing of the E&S management system. The purpose of this system is to evaluate the effectiveness of the E&S procedures and update the management system if necessary. This system meets the national regulation and the IFC (PS1) requirements.

### 10.7.1. ESMP monitoring and review

The ESMP sets out GDIZ procedures for managing, mitigating and monitoring environmental and social impacts, both for construction and operation phases. Monitoring will be carried out in order to determine whether environmental and social outcomes are being achieved.

Monitoring indicators to be followed for the ESMP in construction phase are provided in each plan described in the section 1.1.

The monitoring plan presenting the performance indicators, monitoring frequency, means and responsibilities, is presented in section 10.7.6.

### 10.7.2. ESMP auditing

Audits and site visits will be carried out to determine the level of compliance with the ESMS and evaluate the effectiveness of the ESMS on field. The procedure will define:

- Timing,
- Scope,
- Audit criteria,
- Reporting of audit findings,
- Process for implementing corrective actions.

→ **Based on the results of these different audits undertaken during the year (report from the promotor but also from external parties), the promoter may propose modifications / improvements to the ESMS in consultation with the concerned stakeholders. These modifications may concern integration of unanticipated impacts and / or procedures simplification and / or monitoring indicators modification on badly assessed issues (over/under-estimated) in this ESIA. These modifications to the ESMS must be validated by GDIZ E&S department, the beninese authorities and the lenders involved.**

#### 10.7.2.1. Site visit

The site visit represents the first audit level to ensure that the environmental and social requirements of the tendering documents are implemented by the main contractor and its subcontractors on sites. GDIZ, the main contractor and its subcontractors will set up teams trained in the environmental and social aspects of construction sites to regularly inspect all work areas, to identify any non-compliance (NC), and to initiate the procedure to correct the situation (see next section).

The site visit frequency and associated report is proposed as follow:

- Construction phase: visits on monthly basis.



- The main contractor will produce a “contractor monthly monitoring report” submitted to GDIZ E&S department.
- GDIZ E&S department will send an “environmental monitoring report” to the ABE and ARISE on a quarterly basis.
- Operation phase: the GDIZ E&S department will regularly performed unappointed visit in the GDIZ infrastructures but also in the industrial units.

#### 10.7.2.2. Internal audit

The promoter will plan internal environmental and social audits covering all activities of the ESMP and RAP:

- during the construction, internal environmental and social audits are expected to be conducted on semi-annual basis.
- during operation phase, internal environmental and social audits will be performed on annual basis.

The internal audit, the second audit level, will be conducted by the GDIZ E&S department who **will produce an internal environmental and social audits report** to GDIZ management and ABE.

Indeed, the environmental audit is a procedure governed by Decree No. 2017-332 of 6 July 2017 and the article 81 and following. The internal audit shall result in an audit report specifying "the state of conformity of the organisation's activities and operations with applicable environmental laws and regulations and with the organisation's environmental management plan" (Art. 86).

The internal audit report shall be forwarded to the ABE by 15<sup>th</sup> of December each year at the latest.

#### 10.7.2.3. External audit

The external audits (third audit level) are expected to be conducted by ABE but also lenders, as following:

- **ABE external audit** in compliance with the decree n°2017-332 of 6 July 2017:
  - **External environmental audits** (art. 89 and followings) shall be carried out every 2 years by ABE, which shall inform the notified body at least 10 working days before the start of the external environmental audit. The ABE shall define, in agreement with the audited organisation, the scope and criteria of the audit to be carried out. Following receipt of the external audit report, the promoter must then send to ABE a schedule for the implementation of the required corrective measures.
  - **Environmental inspection** (art. 108 and followings) carried out on the initiative of the promoter or following information or a complaint, which may be written or oral, and which has been addressed to the local or national administrations responsible for environmental protection.
- **Lenders external audit**: this audit is performed by an E&S **consultant appointed by the promoter** before the start of works. He will ensure annual or semi-annual audits, provide his expert opinion on the organization implemented and its effectiveness, the technical and financial resources mobilized, assess the progress of the various action plans and their compliance with the implementation schedule and make recommendations on the obstacle observed. The proposed frequency of these audits is:
  - Construction phase: semi-annual audit.

- Operation phase: annual audit the first 5 years of commissioning.

### 10.7.3. ESMS monitoring and evaluation by ARISE

In addition to the monitoring and auditing program presented above, ARISE will conduct an audit program of GDIZ compliance with its corporate ESMS based on:

- Quarterly internal audits.
- Bi-annual external audits.

These audits can be coupled with GDIZ own auditing procedure.

### 10.7.4. Non-compliance management procedure

A non-compliance management procedure aims at detecting the events that do not meet the health, safety, environmental and social objectives assigned to the Project in the frame of its ESMS, in order to prioritize adverse events so that adequate corrective actions are taken in a scaled and timely manner.

This procedure is an important element of the communication and contractual process between the parties involved, especially during construction phase where numerous actors can intervene in the same time and location. It should be established under common agreement between the main contractor and the promoter. It must be part of the contractual agreement, especially if the promoter wishes to uphold payments of the main contractor in case of major non-compliance.

The main step of the procedure is for the main contractor to systematically identify its non-compliances and rate their level of severity. Non-compliances can be identified during routine site visit, unannounced controls and also during GDIZ HSE manager site visits, internal and external audits.

Typically, events are granted a level of severity associated to communication and handling procedures. The scale below is proposed indicatively and will be adapted to ARISE and GDIZ ESMS.

- **Level 1:** non-compliant situation which does not meet the original requirements but which does not constitute an immediate threat to an identified significant resource. Usually addressed in the normal way during site visits and routine meetings via non-compliance sheets.
- **Level 2:** non-compliant situation which has not yet produced clearly identified damage or an irreversible impact on a sensitive or important resource, or on the safety and health of workers, the personnel of the company in charge of the works and the population, but which requires prompt corrective action and site-specific attention to avoid these effects.

These non-compliances must be communicated by the main contractor to the GDIZ HSE manager on the same day the situation was noted and corrective measures must be implemented as quickly as possible.

- **Level 3:** critical non-compliant situation in which damage is observed to a sensitive resource that is specifically protected, or where imminent damage can be expected to the health and/or safety of workers, company personnel and population.

These non-compliances must be communicated by the main contractor to the GDIZ HSE manager on the same day the situation was noted and corrective measures must be implemented as quickly as possible.

In the event that a corrective measure requires more time for its implementation or if the risk is imminent, GDIZ HSE manager may request a suspension of the work concerned until the observed situation becomes compliant again.

A level-3 non-compliance can lead to a suspension of the main contractor payment until the resolution of the non-compliance.

This identification process will be followed by these procedures:

- a mechanism for stopping work if the situation is considered worrying;
- monitoring of the requested corrective measures implementation and ensuring their effectiveness;
- an opportunity to initiate an incident investigation in order to determine the root causes of the incident and to assess whether changes in specifications, requirements or methods are justified to prevent the recurrence of such a situation in the future.

#### **10.7.5. Data management**

An environmental and social data management system covering all measures and action plans and the ESMP must be put in place by the promoter in order to centralize all the Project E&S documentation resulting from audits and site monitoring.

## 10.7.6. Environmental and social monitoring plan

### 10.7.6.1. Preparation phase

Measures or programs	Item	Performance indicators, obligations of means and / or results	Monitoring frequency	Monitoring means	Set up responsibility	Monitoring responsibility
Environmental and social management system	Policies & procedures	<ul style="list-style-type: none"> <li>* presence of E&amp;S team with adequate skills</li> <li>* 100% of HSES policies exist, are developed and known</li> <li>* 100% of procedures exist, are implemented and known</li> <li>* 0 non compliance observed or non compliance processed within time limits, including causes analysis and corrective measures (with international standards or beninese regulation)</li> <li>* 0 environmental or safety accident registered</li> <li>* 0 complaints or complaints processed within time limits</li> </ul>	All Project-long: * biannual during construction * annual during the 5 first operational years	<ul style="list-style-type: none"> <li>* Monthly Environmental and Social Report (preparation)</li> <li>* Biannual Environmental and Social Report (construction)</li> <li>* Annual Environmental and Social Report (operation)</li> <li>* Documentation provided on-demand</li> <li>* Audit reports from E&amp;S lenders' advisor</li> </ul>	GDIZ	Lenders
Environmental and social management system	Local ESMP monitoring committee set-up	<ul style="list-style-type: none"> <li>* 2 ESMP Committee set-up at Tori-Bossito and Ze municipalities level</li> <li>* 2 women nominated in each committee</li> <li>* 2 persons representing vulnerable groups nominated in each committee</li> </ul>	Ad hoc	<ul style="list-style-type: none"> <li>* Monthly Environmental and Social Report</li> </ul>	GDIZ	GDIZ ABE Lenders
Permits & authorizations	All necessary permits for Project	* 100% of necessary permits are obtained: clearing, water supply & drilling, wastewater discharges and waste	Quarterly basis	* Presence of authorization documents	GDIZ	ABE DDLESD – ALD Lenders
Permits & authorizations	All necessary permits for work areas	* 100% of necessary permits are obtained: clearing, wastewater discharges and waste	Quarterly basis	* Presence of authorization documents	Main contractor	GDIZ ABE Lenders

Measures or programs	Item	Performance indicators, obligations of means and / or results	Monitoring frequency	Monitoring means	Set up responsibility	Monitoring responsibility
Additional studies under GDIZ responsibility	Hydraulic study	* required study completed	Ad hoc	* Final report available * Proposed measures taken into account in the appropriate management plan (both for construction or operation)	GDIZ	Lenders
	Hydrogeologic study	* required study completed	Ad hoc	* Final report available * Proposed measures integrated in the E&S management plans of GDIZ and / or the main contractor	GDIZ	Lenders
	ESIA for the 6 wastewater treatment plant	* required study completed	Ad hoc	* Final report available * Proposed measures integrated in the E&S management plans of GDIZ and / or the main contractor	GDIZ	Lenders
	EIA for boreholes drilling	* required study completed	Ad hoc	* Final report available * Proposed measures integrated in the E&S management plans of GDIZ and / or the main contractor * environmental permit available	GDIZ	Lenders
	E&S specification for industrials	* E&S specifications for future GDIZs' industrials completed	Ad hoc	* Final E&S specifications report available	GDIZ	Lenders
Additional studies out of GDIZ responsibility 'but with its cooperation and / or approbation	Strategic Environmental Assessment for SEZ	* required study completed (under government responsibility)	Ad hoc	* Final report available and shared with GDIZ	Beninese Government	Lenders
	ESIA landfill	* required study completed (under government responsibility)	Ad hoc	* Final report available and shared with GDIZ	Beninese Government	Lenders
Human resources management	Recruitment quota setting	* 100% of clauses on local recruitment, local sub-contracting priority and transfer of skills with local companies in the Tender Documents for the works	Ad hoc	Call for tender documents and E&S specifications for main contractor	GDIZ	Lenders

Measures or programs	Item	Performance indicators, obligations of means and / or results	Monitoring frequency	Monitoring means	Set up responsibility	Monitoring responsibility
Stakeholder engagement plan	Deployment of the plan: recruitment, tools and procedures	<ul style="list-style-type: none"> <li>* 100% of Community Relation Service personnel recruited (5 persons)</li> <li>* 100% of Stakeholder engagement documentary structure and monitoring tools (stakeholder database, shared agenda, consultation register) created</li> <li>* 100% of grievance management mechanism created (complaint register, grievance documents, procedures, etc.)</li> </ul>	Monthly	* Monthly Environmental and Social Report	GDIZ	Lenders
Resettlement Action Plan	Study and implementation	<ul style="list-style-type: none"> <li>* required study completed (RAP)</li> <li>* 100% of Project-affected persons compensated</li> <li>* partners for livelihood restoration recruited</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>* Monthly Environmental and Social Report</li> <li>* RAP completion audit report</li> </ul>	GDIZ	GDIZ ABE Lenders
Cultural heritage management plan	Protection of Anavie forest and cultural ceremonies	<ul style="list-style-type: none"> <li>* final master plan excluding sacred forest or presenting detailed protection measures</li> <li>* 100% of ceremonies requested by local leaders organized</li> <li>* 0 complaint related to management of cultural heritage</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>* Monthly Environmental and Social Report</li> <li>* Final master plan available</li> <li>* Complaint register</li> </ul>	GDIZ	GDIZ ABE Lenders
Community development plan	Strategy definition	* required study completed	Ad hoc	* Final report available	GDIZ	GDIZ Lenders



### 10.7.6.2. Contruction phase

Measures or programs	Item	Performance indicators, obligations of means and / or results	Monitoring frequency	Monitoring means	Set up responsibility	Monitoring responsibility
Air and noise emission management plan	Dust	* 0 non-compliance with the procedure or non-compliance properly registered and processed * 0 complaints or complaints processed within time limits	Daily basis for observation Mensual	* Direct observation / visual inspection * Complaints register	Main contractor	GDIZ ABE
	Noise	* 0 non-compliance with the procedure or non-compliance properly registered and processed * 0 complaints or complaints processed within time limits * Recorded values in accordance with Benines regulations and / international standards (WHO, IFC)	Quarterly basis	* Direct observation / visual inspection * Complaints register	Main contractor	GDIZ ABE
Biodiversity management plan	Habitat and vegetation Invasive species	* 0 non-compliance with the procedure or non-compliance properly registered and processed * no degradation of vegetation beyond the right-of-way * 100% of invasive species clusters managed in line with the requirements * 0 complaints or complaints processed within time limits	Continuously for observations Audit frequency	* Audit / site visit report * Direct observation / visual inspection * Complaints register	Main contractor	GDIZ ABE
	Fauna	* no protected species hunted by workers	Continuously for observations Audit frequency	* Audit / site visit report * Direct observation / visual inspection	Main contractor	GDIZ ABE
	Revegetation program	* 100% of the selected seeds/seedlings of the species to be planted collected * 100% complete regeneration * 100% of areas to be revegetated/planted reached * 100% of dead plants replaced	Mensual	* Audit / site visit report * Forestry - initial vegetation census for all areas (GDIZ, work area & base camp) * Forestry monitoring report	Forestry	GDIZ ABE

Measures or programs	Item	Performance indicators, obligations of means and / or results	Monitoring frequency	Monitoring means	Set up responsibility	Monitoring responsibility
Erosion and soil management plan	Soil erosion, soil storage	<ul style="list-style-type: none"> <li>* 0 non-compliance with the procedure or non-compliance properly registered and processed</li> <li>* 0 complaints or complaints processed within time limits</li> <li>* 100% of temporary affected soil rehabilitated (work area and base camp)</li> <li>* Ratio cut / fill = 0</li> </ul>	Mensual	<ul style="list-style-type: none"> <li>* Audit / site visit report</li> <li>* Direct observation / visual inspection</li> <li>* Complaints register</li> </ul>	Main contractor	GDIZ ABE
Waste management plan	Waste production, storage and disposal	<ul style="list-style-type: none"> <li>* 0 non-compliance with the procedure or non-compliance properly registered and processed</li> <li>* 0 complaints or complaints processed within time limits</li> <li>* Existence of a register of low-hazardous waste: quantity, recovery or treatment</li> <li>* Existence of a register of hazardous waste: Quantity, storage in a sealed area, evidence of the handling of hazardous waste</li> <li>* 100% of produced waste properly stored</li> <li>* 100% of produced waste properly disposed</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>* Audit / site visit report</li> <li>* Waste tracking</li> <li>* Direct observation / visual inspection</li> <li>* Complaints register</li> </ul>	Main contractor	GDIZ ABE
Hazardous products and spills management plan	Hazardous products	<ul style="list-style-type: none"> <li>* 0 non-compliance with the procedure or non-compliance properly registered and processed</li> <li>* 100% products listed are available onsite and conversely</li> <li>* No product prohibited by WHO or by national regulation</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>* Audit / site visit report</li> <li>* Products registering and monitoring list</li> <li>* MSDS list</li> </ul>	Main contractor	GDIZ ABE
	Emergency plan	<ul style="list-style-type: none"> <li>* 0 non-compliance with the procedure or non-compliance properly registered and processed</li> <li>* 100% of spills were dealt with during the day.</li> <li>* 100% of employees trained in firefighting means</li> <li>* Existence of an intervention register (volumes spilled or other accident and actions implemented)</li> </ul>	Mensual	<ul style="list-style-type: none"> <li>* Audit / site visit report</li> <li>* Accident report</li> <li>* Training list participation</li> </ul>	Main contractor	GDIZ ABE

Measures or programs	Item	Performance indicators, obligations of means and / or results	Monitoring frequency	Monitoring means	Set up responsibility	Monitoring responsibility
Water resources and discharges management plan	Discharges	<ul style="list-style-type: none"> <li>* 100% of wastewater is treated (on plan)</li> <li>* 100% of site maintenance and hydrocarbon storage areas equipped with sealed areas and a hydrocarbon separator</li> <li>* 100% sedimentation ponds approved for the recovery of wash water rich in concrete</li> <li>* 100% compliance for discharges (most restrictive threshold between local values regulation / international standards)</li> <li>* 0 non-compliance with the procedure or non-compliance properly registered and processed</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>* Audit / site visit report</li> <li>* Discharges monitoring report</li> </ul>	Main contractor	GDIZ ABE
	Water resources	<ul style="list-style-type: none"> <li>* no conflict related to water consumption</li> <li>* 0 complaints or complaints processed within time limits</li> <li>* 100% of new roads with porous asphalt</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>* Audit / site visit report</li> <li>* Complaints register</li> </ul>	Main contractor	GDIZ ABE
Human resources management	Local employment	<ul style="list-style-type: none"> <li>* 50% of workers recruited on construction site either PAP or coming from 8 villages of study area</li> <li>* 0 complaint related to local recruitment</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>* Contractor monthly monitoring report</li> <li>* Audit / site visit report</li> <li>* Complaints register</li> </ul>	Main contractor	GDIZ ABE
Stakeholder engagement plan	Implementation	<ul style="list-style-type: none"> <li>* 100% of engagement activities planned in construction phase in SEP achieved</li> <li>* 100% of complaint processed within time limits</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>* Monthly report on stakeholder engagement activities and complaint management</li> </ul>	GDIZ	GDIZ Lenders
Cultural heritage management	Protection of Anavie forest Chance-find procedure	<ul style="list-style-type: none"> <li>* 100% of workers aware about the presence of sacred forest and restrictions</li> <li>* 100% of workers aware about the chance-find procedure</li> <li>* Sacred forest physically delimited</li> <li>* 100% of the archaeological artefacts found have been preserved</li> <li>* 0 complaint related to management of cultural heritage</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>* Contractor monthly monitoring report</li> <li>* Audit / site visit report</li> <li>* Complaints register</li> </ul>	Main contractor	GDIZ ABE Ministry of Tourism, Culture and Arts

Measures or programs	Item	Performance indicators, obligations of means and / or results	Monitoring frequency	Monitoring means	Set up responsibility	Monitoring responsibility
Occupational Hygiene, Health and Safety Plan	Protection of workers' health and safety	<ul style="list-style-type: none"> <li>* 100% of workers equipped with adequate PPE</li> <li>* 100% of job hazard analysis completed</li> <li>* 100% of workers benefited from awareness-raising sessions</li> <li>* 100% of workers signed Code of conduct</li> <li>* 0 accident on the worksite</li> <li>* 0 worker sick on site</li> <li>* 0 complaint lodged by workers on their working conditions or rights</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>* Contractor monthly monitoring report</li> <li>* Audit / site visit report</li> <li>* Complaints register</li> </ul>	Main contractor	GDIZ ABE
Traffic and road safety plan	Protection of workers' health and safety	<ul style="list-style-type: none"> <li>* 100% of drivers submitted to proficiency test</li> <li>* 100% of planned traffic regulations applied on public road</li> <li>* 100% of planned traffic regulations applied on construction site road</li> <li>* 0 accident caused by a Project vehicle</li> <li>* 0 complaint on traffic and road safety issues</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>* Contractor monthly monitoring report</li> <li>* Audit / site visit report</li> <li>* Complaints register</li> </ul>	Main contractor	GDIZ ABE
Community health and safety plan	Awareness-raising program	<ul style="list-style-type: none"> <li>* 100% of awareness-raising sessions organized</li> <li>* 0 complaint on health of safety issues</li> </ul>	Biannual	<ul style="list-style-type: none"> <li>* Biannual Environmental and Social Report</li> <li>* Complaints register</li> </ul>	GDIZ	GDIZ ABE Lenders
Social influx management plan	Influx monitoring	<ul style="list-style-type: none"> <li>* 100% of indicators for influx monitoring defined and validated</li> <li>* 100% of local stakeholders agreed to provide regular data on social influxes</li> <li>* 0 complaint on social influxes</li> </ul>	Biannual	<ul style="list-style-type: none"> <li>* Biannual Environmental and Social Report</li> <li>* Complaints register</li> </ul>	GDIZ	GDIZ ABE Lenders
Social inclusion plan	Recruitment	<ul style="list-style-type: none"> <li>* 5% of recruited workers are women or PWDs</li> <li>* 0 complaint on social inclusion issues</li> </ul>	Biannual	<ul style="list-style-type: none"> <li>* Contractor monthly monitoring report</li> <li>* Complaints register</li> </ul>	Main contractor	GDIZ ABE Lenders
Community development plan	Implementation	<ul style="list-style-type: none"> <li>* 100% of planned fund disbursed</li> </ul>	Biannual	<ul style="list-style-type: none"> <li>* Biannual Environmental and Social Report</li> <li>* Final report available</li> </ul>	GDIZ	GDIZ Lenders

### 10.7.6.3. Operation phase

Measures or programs	Item	Performance indicators, obligations of means and / or results	Monitoring frequency	Monitoring means	Set up responsibility	Monitoring responsibility
Water resource management and discharge plan	Wastewater treatment discharges	<ul style="list-style-type: none"> <li>* 100% compliance for discharges from CETP (most restrictive threshold between local values regulation / international standards)</li> <li>* No stagnant water observed in the central drain</li> <li>* 0 flooding issues observed downstream the GDIZ</li> <li>* 0 complaints or complaints processed within time limits in relation water quality or flooding issues</li> </ul>	Monthly	<ul style="list-style-type: none"> <li>* Utility reporting (CETP and STP, central drain)</li> <li>* Complaints register</li> </ul>	GDIZ	GDIZ Lenders
Traffic and road safety plan	Awareness-raising program	<ul style="list-style-type: none"> <li>* 100% of awareness-raising sessions organized</li> <li>* 0 complaint on health of safety issues</li> </ul>	Annual	<ul style="list-style-type: none"> <li>* Annual Environmental and Social Report</li> <li>* Complaints register</li> </ul>	GDIZ	GDIZ Lenders
Waste management plan	Waste production	<ul style="list-style-type: none"> <li>* 0 complaints or complaints processed within time limits</li> <li>* Existence of a register of low-hazardous waste: quantity, recovery or treatment</li> <li>* Existence of a register of hazardous waste: Quantity, storage in a sealed area, evidence of the handling of hazardous waste</li> <li>* 100% of produced waste properly stored</li> <li>* 100% of produced waste properly disposed</li> </ul>	Annual	<ul style="list-style-type: none"> <li>* Annual Environmental and Social Report</li> <li>* Complaints register</li> <li>* Utility reporting (transfer stations and composting trenches)</li> </ul>	GDIZ	GDIZ Lenders

Measures or programs	Item	Performance indicators, obligations of means and / or results	Monitoring frequency	Monitoring means	Set up responsibility	Monitoring responsibility
Occupational health and safety plan for GDIZ workers	Workers safety	<ul style="list-style-type: none"> <li>* 0 complaint on health of safety issues from workers</li> <li>* 100% of workers equipped with appropriate PPE</li> <li>* 100% of workers with appropriate accreditation (specially for electrical activities)</li> </ul>	Annual	<ul style="list-style-type: none"> <li>* Annual Environmental and Social Report</li> <li>* Complaints register</li> <li>* Workers field</li> </ul>	GDIZ	GDIZ Lenders
Maintenance plan for common infrastructures	Hazardous machines and facilities	<ul style="list-style-type: none"> <li>* 100% of equipment checked in appropriate deadline</li> <li>* 100% compliance for noise emissions (most restrictive threshold between local value / international standards)</li> <li>* 100% compliance for air emissions (most restrictive threshold between local value / international standards)</li> </ul>	every quarter or as given in supplier's specifications	<ul style="list-style-type: none"> <li>* Annual Environmental and Social Report</li> <li>* Utility reporting (electrical substations)</li> </ul>	GDIZ	GDIZ Lenders
	Green spaces	* No prohibited products for the maintenance of green spaces	Annual	* Annual Environmental and Social Report	GDIZ	GDIZ Lenders
Emergency management plan	Emergency drills	<ul style="list-style-type: none"> <li>* 100% of emergency drills performed with all GDIZ stakeholders</li> <li>* 0 environmental or safety accident</li> </ul>	Annual	* Annual Environmental and Social Report	GDIZ	GDIZ Lenders
Monitoring procedures	Industrial operator	* 100% of indicators required by GDIZ provided	Annual	* Annual Environmental and Social Report	Industrial	GDIZ Lenders
	All GDIZ utilities & facilities, including industrial units	* 100% of indicators required filled	Annual	* Annual Environmental and Social Report	GDIZ	GDIZ Lenders



Measures or programs	Item	Performance indicators, obligations of means and / or results	Monitoring frequency	Monitoring means	Set up responsibility	Monitoring responsibility
Human resources management	Recruitment quota setting	*50% of workers at GDIZ either PAP or coming from 8 villages of study area *50% of workers at industries either PAP or coming from 8 villages of study area *100% of workers contracts available * 0 complaint related to local recruitment	Annual	* Annual Environmental and Social Report	GDIZ Industries	GDIZ Lenders
Stakeholder engagement plan	Implementation	* 100% of engagement activities planned in operation phase in SEP achieved * 100% of complaint processed within time limits	Annual	* Annual Environmental and Social Report	GDIZ	GDIZ Lenders
Cultural heritage management	Protection of Anavie forest	* 100% of workers aware about the presence of sacred forest and restrictions * Sacred forest physically delimited * 0 complaint related to management of cultural heritage	Annual	* Annual Environmental and Social Report	GDIZ	GDIZ Lenders
Community development plan	Implementation	* 100% of planned fund disbursed	Annual	* Monthly Environmental and Social Report * Final report available	GDIZ	GDIZ Lenders

## **10.9. Modalities and cost of implementing the ESMP**

### **10.9.1. Timeline**

The timeline for the implementation of the Environmental and Social Management Plan is presented in the following table.

Table 52 Timeline

	PREPARATION												CONSTRUCTION												OPERATION																						
	YEAR 1												YEAR 2												YEAR 3												YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	YEAR 11	YEAR 12	YEAR 13	[...]
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12											
Environmental and social management system																																															
Permits and authorization																																															
Additional studies																																															
Revegetation program																																															
Stakeholder engagement plan																																															
Resettlement Action Plan																																															
Cultural heritage management																																															
Community development plan																																															
Human resources management																																															
Biodiversity management plan																																															
Air emissions and noise management plan																																															
Erosion and soil quality management plan																																															
Waste management plan																																															
Hazardous products and spills																																															
Water resource management and discharge management plan																																															
Occupational Hygiene, Health and Safety Plan																																															
Traffic and road safety plan																																															
Community health and safety plan																																															
Social influx management plan																																															
Social inclusion plan																																															
ESMP & procedures																																															
ESMS monitoring and review																																															
Audits																																															

## 10.9.2. Estimated budget for the implementation of the ESMP

The overall estimated budget for the ESMP and ESMS framework represents **1,297,975,449 CFA (1,978,751 EUR)**. It is divided as follow:

**Table 53 Estimated ESMP budget**

Phase	Estimated budget FCFA	Estimated budget EURO
Preparation phase	432,177,681 CFA	658,851 EUR
Construction phase	379,600,000 CFA	578,696 EUR
Operation phase	188,200,000 CFA	286,909 EUR
E&S monitoring and follow-up	180,000,000 CFA	274,408 EUR
Provision (10%)	117,997,768 CFA	179,886 EUR
<b>TOTAL</b>	<b>1,297,975,449 CFA</b>	<b>1,978,751 EUR</b>

The detailed budget table is presented in the table below.

**Table 54 Detailed estimated ESMP budget**

Measures or programs	Item	Responsible	Implementation	Budget (FCFA)	Budget (EUR)
<b>Preliminary plans for preparation phase</b>					
Environmental and social management system	Environmental and Social Department set up and team recruitment (3 persons)	GDIZ	GDIZ	46,800,000 CFA	71,346 EUR
Additional studies	Hydraulic study	GDIZ	GDIZ Consultants	19,678,710 CFA	30,000 EUR
	Hydrogeologic study	GDIZ	GDIZ Consultants	16,398,925 CFA	25,000 EUR
	ESIA CETP and STP	GDIZ	GDIZ Consultants	39,357,420 CFA	60,000 EUR
	ESIA waste transfer station and composting trenches	GDIZ	GDIZ Consultants	19,678,710 CFA	30,000 EUR
	Hazard study - CETP/STP & substation	GDIZ	GDIZ Consultants	39,357,420 CFA	60,000 EUR
	EIA boreholes drilling	GDIZ	GDIZ Consultants	13,119,140 CFA	20,000 EUR
Revegetation program	Green belt	GDIZ	Forestry expert	15,406,130 CFA	23,486 EUR
	Forestry expert recruitment	GDIZ	GDIZ	3,081,226 CFA	4,697 EUR
Stakeholder engagement plan	Community Relation Service set up and team recruitment (5 persons)	GDIZ	GDIZ	52,800,000 CFA	80,493 EUR

Measures or programs	Item	Responsible	Implementation	Budget (FCFA)	Budget (EUR)
	Allowance to implement SEP (travels, per diems, food and water during meetings, etc.)	GDIZ	GDIZ	24,000,000 CFA	36,588 EUR
Resettlement Action Plan	RAP implementation	GDIZ	GDIZ	Budget to be determined after RAP study completion	Budget to be determined after RAP study completion
Cultural heritage management	Ceremonies to be performed	GDIZ	GDIZ	2,500,000 CFA	3,811 EUR
Community development plan	Full multi-annual budget	GDIZ	GDIZ	140,000,000 CFA	213,429 EUR
<b>SUB-TOTAL</b>				<b>432,177,681 CFA</b>	<b>658,851 EUR</b>
<b>ESMP for construction phase</b>					
Environmental and social management system	Environmental and Social Department set up and team recruitment (4 persons)	GDIZ	GDIZ	93,600,000 CFA	142,692 EUR
	Local ESMP monitoring committee meetings	GDIZ	GDIZ	3,200,000 CFA	4,878 EUR
Permits and authorization	Permits obtention	Main contractor	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
Stakeholder engagement plan	Community Relation Service set up and team recruitment (5 persons)	GDIZ	GDIZ	105,600,000 CFA	160,986 EUR
	Allowance to implement SEP (travels, per diems, food and water during meetings, etc.)	GDIZ	GDIZ	48,000,000 CFA	73,176 EUR
Human resources management	Local recruitment program	GDIZ	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
	Workers' awareness-raising and code of conduct	GDIZ	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
Biodiversity management plan	Full plan implementation	Main contractor	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor

Measures or programs	Item	Responsible	Implementation	Budget (FCFA)	Budget (EUR)
Air emissions and noise management plan	Full plan implementation	Main contractor	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
Erosion and soil quality management plan	Full plan implementation	Main contractor	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
Waste management plan	Full plan implementation	Main contractor	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
Hazardous products and spills management plan	Full plan implementation	Main contractor	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
Water resource management and discharge management plan	Full plan implementation	Main contractor	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
Cultural heritage management plan	Full plan implementation	Main contractor	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
Occupational Hygiene, Health and Safety Plan	Full plan implementation	Main contractor	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
Traffic and road safety plan	Full plan implementation	Main contractor	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
Community health and safety plan	Contractor measures implementation	Main contractor	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
	Awareness-raising program on road safety, hygiene and HIV/Aids in 8 villages	GDIZ	Main contractor & subc.	57,600,000 CFA	87,811 EUR
Social influx management plan	Contractor measures implementation	Main contractor	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
	Influx monitoring in 8 villages	GDIZ	GDIZ	1,600,000 CFA,	2,439 EUR
	Support to water infrastructures in 4 villages	GDIZ	GDIZ	60,000,000 CFA	91,469 EUR
	Support to 2 district health centres	GDIZ	GDIZ	10,000,000 CFA	15,245 EUR
Social inclusion plan	Contractor measures implementation	Main contractor	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
<b>SUB-TOTAL</b>				<b>379,600,000 CFA</b>	<b>578,696 EUR</b>



Measures or programs	Item	Responsible	Implementation	Budget (FCFA)	Budget (EUR)
<b>ESMP for operation phase</b>					
Environmental and social management system	Environmental and Social Department set up and team recruitment (2 persons)	GDIZ	GDIZ	162,000,000 CFA	246,967 EUR
Community health and safety plan	Awareness-raising program on road safety in 8 villages	GDIZ	GDIZ Industries	26,200,000 CFA	39,942 EUR
<b>SUB-TOTAL</b>				<b>188,200,000 CFA</b>	<b>286,909 EUR</b>
<b>E&amp;S monitoring and follow-up</b>					
ESMS monitoring and review	Indicator monitoring (construction)	Main contractor	Main contractor & subc.	Budget to be proposed by Main contractor	Budget to be proposed by Main contractor
	Indicator monitoring (operation)	GDIZ	GDIZ Industries	Included in the budget of the E&S GDIZ team	Included in the budget of the E&S GDIZ team
E&S Audits	Internal audits (construction)	GDIZ	Main contractor & subc.	Included in the budget of the E&S GDIZ team	Included in the budget of the E&S GDIZ team
	Internal audits (operation)	GDIZ	GDIZ Industries	Included in the budget of the E&S GDIZ team	Included in the budget of the E&S GDIZ team
	External audit conducted by an E&S consultant appointed by GDIZ (semi-annual in construction)	GDIZ	E&S consultant	120,000,000 CFA	182,939 EUR
	External audit conducted by an E&S consultant appointed by GDIZ (annual in operation)	GDIZ	E&S consultant	60,000,000 CFA	91,469 EUR
<b>SUB-TOTAL</b>				<b>180,000,000 CFA</b>	<b>274,408 EUR</b>
<b>TOTAL</b>				<b>1,179,977,681 CFA</b>	<b>1,798,864 EUR</b>
<b>10% PROVISION</b>				<b>117,997,768 CFA</b>	<b>179,886 EUR</b>
<b>GRAND TOTAL</b>				<b>1,297,975,449 CFA</b>	<b>1,978,751 EUR</b>



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# ANNEXES



**Annex I      Promulgation of Public Utility Declaration (DUP) about  
the project for the creation of the 10,000 ha Special Economic  
Zone (SEZ) of Glo-Djigbé**

**COPIE**

## Compte rendu du Conseil des Ministres

Le Conseil des Ministres s'est réuni ce mercredi 15 janvier 2020, sous la présidence de Monsieur Patrice TALON, Président de la République, Chef de l'Etat, Chef du Gouvernement.

Les décisions ci-après ont été prises.

### **I- Mesures normatives.**

#### **Délimitation et déclaration d'utilité publique du périmètre de la Zone économique spéciale de Glo-Djigbé.**

Les Communes d'Abomey-Calavi, de Tori-Bossito et de Zè constituent un pôle de concentration de projets phares du Programme d'Action du Gouvernement. En vue de soutenir la dynamique ainsi amorcée, un nouveau fonds de terre d'environ 10.000 hectares, situé entre les trois localités a été identifié pour servir de Zone économique spéciale.

Dans le but de favoriser le développement des activités économiques, tout en préservant les agglomérations et les noyaux villageois, le Conseil a consenti à subdiviser le périmètre du projet en trois lots.

C'est à cette fin que le décret portant délimitation et déclaration d'utilité publique du périmètre concerné est adopté, pour enclencher la procédure devant aboutir à la libération des sites.

Les Ministres impliqués dans l'aménagement du domaine prendront les dispositions subséquentes relativement à la sécurisation des lieux, aux évaluations foncières et immobilières, puis au dédommagement des personnes affectées.

## **Annex II    Terms of reference for the Environmental and Social Impact Assessment**

# REPUBLIC OF BENIN

## Environmental and Social Impact Assessment

Project for the Development and Servicing of Glo-Djigbé Industrial Zone in the Municipalities of Tori-Bossito and Zé



## TERMS OF REFERENCES

*BENP190008 – 6 March 2020 – N° 102501/VB*

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# 1. Introduction

To increase its industrial potential and diversify its sources of income, the Government of Benin has embarked on a project to develop an industrial zone (IZ): Glo-Djigbé IZ. Factors conducive to the establishment of this type of zone are the constant improvement of the business climate, investment opportunities, the facilitation of the installation of industries and the growing supply of skilled workers.

The development, construction and operation of this zone have been entrusted by the government to the ARISE company which intervenes within the framework of a public-private partnership. Glo-Djigbé industrial zone will have an agro-industrial vocation and will provide investors and national and foreign firms with serviced infrastructure while creating advantageous economic and financial conditions.

The IZ will be located in the immediate vicinity of the future Glo-Djigbé airport. It will be located in the Special Economic Zone (SEZ) of Glo-Djigbé, the creation of which was announced in January 2020 by the government. With a surface area of 10,000 ha, this SEZ will be organized into three areas of different sizes located between the municipalities of Allada, Tori-Bossito and Zè.

The works to develop this industrial zone and its exploitation are likely to have both positive and negative impacts on the environment and the populations concerned.

This document constitutes the Terms of Reference (TOR) for this environmental impact study, the first step in the process of environmental authorization of the project by the Beninese environmental authorities.

It summarizes the project, its context and justification, establishes an initial qualification of the receiving environment, proposes a methodological approach for conducting the environmental impact study and presents the profile of the team mandated by the project owner to carry out the study.

# 2. Project context and justification

According to the African Development Bank, Benin's economic growth remained robust in 2019 (estimated at 6.7%) thanks to an increase in public investment representing 21% of GDP (BAD, 2019). Growth is driven by the agricultural sector due to record cotton production, the vitality of the construction sector and the dynamism of the Autonomous Port of Cotonou. Apart from these activities, the industrial sector remains poorly developed and is not a significant engine of growth for the country.

Benin's industrial sector is characterized by the presence of small and medium-sized industries with low production and processing capacities for exportable products. The supply of industrial zones that can boost these exports in the country is limited. Despite the creation in 2005 of a general Industrial Free Zone regime (Law No. 2005-16 of September 2005) allowing geographically defined free zones with free points or free enterprises to coexist on Beninese territory, and the subsequent development of several zones, the country's industrialization objectives have not been achieved. The industrial zones created under this Act, such as that of Sémè-Podji, or Gakpé, do not have significant levels of activity. Other sites that were planned to be developed have finally not been developed.





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In order to revive the country's industrialization dynamic, the Government of Benin wished to engage in the development of the industrial zone of Glo-Djigbé. This project will achieve one main objective: to industrialize the country by offering favourable conditions for the establishment of raw material companies on the national territory in order to diversify the national economy.

## 3. Project presentation

### 3.1. Project location

The IZ of Glo-Djigbé will be located close to the future international airport of Glo-Djigbé, about 28 km from Cotonou. It will be located on the territory of two municipalities, those of Zè and Tori-Bossito in the Atlantic department. There are eight villages closest to the project site, i.e. between 300 and 900 metres from the boundaries of the project site:

- Agbodjedo, Anavié, Djitin Aga and Houézè in the municipality of Zè ;
- Gbètaga, Sogbé, Zèbè and Dokanmè in the municipality Tori-Bossito.

### 3.2. Objectives of the project

Glo-Djigbé IZ aims to offer a competitive ecosystem to investors in order to increase agro-industrial production on the national territory. The SEZ has great potential and will contribute significantly to Benin's socio-economic development, including the industrialization of the country, job creation and general economic development.

Glo-Djigbé IZ will host a first-class business park focusing mainly on agro-industry with a special focus on the cashew nut and cotton processing industries. Indeed, demand for cashew nuts and cotton is high worldwide and Benin is one of the world's leading producers.

The IZ will also be open to other agricultural sectors (e.g. pineapple and vegetable processing) and other industries (e.g. fertilizer production, building materials or consumer goods). As they are approved, these industrial units will be built on previously serviced plots of land.

The completion of such a project will be a source of job creation and added value for the Beninese economy.

### 3.3. Main activities of the project

The project activities will consist of servicing the land and developing shared utilities (water, electricity and wastewater treatment), and then making lots available to investors for plant locations. The IZ will be developed in a gradual manner in order to optimize investment and project profitability. Thus, the project will be carried out in two phases.

In the first phase of the project, development will cover 692 ha, of which 485 ha will be leased as an industrial, commercial and storage area, the remainder being devoted to various infrastructures (car park,



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green areas, etc.) and common facilities (one-stop shop building). In the second phase, the project will be extended by approximately 775.2 ha to a total of 1 468 ha.

### **3.4. Presentation of promoters and developers**

The project is led by a consortium formed by the company ARISE INTEGRATE and the Republic of Benin, represented by the Investment and Export Promotion Agency (APIEx) and the Office of Analysis and Investigations (BAI).

## **4. Presentation of the environmental and social impact study**

### **4.1. Objectives of the environmental and social impact study**

This study will be carried out by the Antea Group consultancy firm and its consortium composed of Antea France and Antea Benin. The objective of Antea Group, as a consulting service in the field of environmental and social impact studies, is to carry out the various studies relating to the project for the development and equipment of the Glo-Djigbé Industrial Zone located in the district of Tori-Cada, commune of Tori-Bossito and in the district of Tangbo-Djèvi, commune of Zè; while respecting the laws and regulations in vigour in the Republic of Benin.

The general objective will be realized through the achievement of the following specific objectives:

- develop a methodological approach for the conduct of the Study;
- present the context and justification of the project;
- present the project and its options;
- describe the institutional, legislative and regulatory framework for the implementation of the project;
- describe the receiving environment likely to be affected by the project;
- describe the project components and analyse the alternatives;
- identify the main issues related to the implementation of the project;
- present the results of the public consultation;
- describe the environmental impacts of the project;
- analyze the impacts of the project;
- propose measures to mitigate negative impacts and compensate for the project's residual impacts;
- analyze the technological risks and accidents and the measures to be taken;
- develop an Environmental and Social Management Plan (ESMP) ;



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- propose a monitoring and follow-up program for the project.

## 5. Brief presentation of the project's receiving environment and the major impacts anticipated.

### 5.1. Physical environment

The project area has a relatively flat topography with the exception of its centre, which has a very slight undulation. The soils have a ferralitic nature. Cartographic data from the National Geographic Institute indicates a watercourse located south-east of the project area that does not appear on the project site and could be temporary in nature. The nearest permanent river, the Lama depression, is located approximately 2 km from the project site.

### 5.2. Natural environment

The climate is sub-equatorial in the south of the country, with a large dry season from November to March, and a smaller one in July-August. Vegetation formations in the project area are largely anthropized and no longer have large forested areas with preserved natural vegetation. Shrub vegetation marks the edges of the fields with the scattered presence of large notable trees. The apparent absence of watercourses on the project site implies that there are probably no wetlands, which often have rich aquatic and terrestrial biodiversity and may require further investigation.

### 5.3. Human environment

The project site is surrounded by eight villages attached to two different communes: Tori-Bossito and Zé. On the site itself, there are no villages but scattered houses. Almost the entire site is cultivated due to the very fertile agricultural land supporting food and commercial production including pineapple to Nigeria, oil palm, cassava and maize.

## 6. Methodology for conducting the impact study

### 6.1. Legal framework

The Beninese legal framework and the good practices of international reference organizations applicable to the project will be examined in more detail in the impact study. The consequences of Beninese regulations for the project will be highlighted (thresholds, mandatory documents, etc.).

Each text cited will be the subject of a description of its concrete involvement in the project. In addition, the procedures and actors involved in obtaining the necessary environmental and social authorizations will be described.



## 6.2. Methodology for collecting data about the initial state

The first step in the information search will be the analysis of all data and reports pertaining to the natural and human environment of the project study area.

The data to be analyzed includes scientific textbooks, reports, mass maps, aerial photographs and newspaper articles from both national and international journals provided. The purpose of this analysis is to build an environmental database for this ESIA and to obtain a preliminary identification of the E&S issues for the project, as well as the points where information is needed for the project but is lacking.

Once the literature review has been carried out, this initial database will then be supplemented by the information collected during the field investigations.

## 6.3. Investigations of the physical environment

Investigations of the physical environment will be carried out by ANTEA's team of consultants through a reconnaissance visit of the project site. This visit will enable the different teams (cartographers, sociologists and environmentalists) to get to know the area and to make a direct observation of the elements of the environment likely to be affected in the framework of the implementation of the project.

The objective of this investigation is to be able to characterize the following elements:

- the topography (reliefs, slopes) ;
- hydrography and hydrogeology (surface and groundwater);
- the natural constraints and risks in the project right-of-way.

## 6.4. Investigations of the biological environment

Investigations of the biological environment will provide additional information through interviews with the Beninese services in charge of natural environment management and naturalist NGOs on the fauna, flora and habitats of the preliminary study area. Other information will be gathered more informally through exchanges with the population.

An overall list of all these plant species, according to whether they are protected, rare, threatened, endemic or of heritage value, will be drawn up.

The collection of data on fauna will be conducted in conjunction with that of flora. The technique used will be direct observation and exchange with the inhabitants of the area, in this case the hunters. The species sought will concern any type of fauna that can be observed directly or indirectly (tracks, nests, droppings, etc.), whether mammals, birds, reptiles, insects or amphibians.

Attention will be given to species of restricted biogeographical distribution, as well as to species present in Benin whose protection is of global interest.



## 6.5. Investigations of the human environment

The surveys will be carried out in the two municipalities concerned by the project, Zé and Tori-Bossito, more specifically in the villages that are part of the project's study area.

As part of the preparation of the surveys, field observation will be carried out to better design the data collection tools (questionnaires and interview guides), anticipate difficulties and adapt the collection method and protocol (sampling, contacting local authorities, identifying villages).

Depending on the specificities of the information to be researched, the data collection techniques will be qualitative and quantitative in nature, considered in a complementary manner. Different tools will be used to collect data:

- Visual observations and photography.
- Individual interviews with resource persons: village chiefs and village customary authorities, mayors and their deputies, civil society organizations: it may be interesting to meet representatives of these organizations using the proposed guide, BUT above all it is necessary to list all the associations operating in the village, their role, their number of members.
- Focus-group with different socio-demographic or socio-professional categories.

The Consultant's social communication strategy will be based on the direct participation of stakeholders (PPs) at central, decentralized (prefectural), local and riparian levels, which PPs will have been identified before and during the field stage.

It aims at creating a climate of trust and free speech conducive to collecting the maximum amount of information (grievances, expectations) and advice to minimize the negative impacts of the project (environmental, social, gender, health, safety, human rights) on the stakeholders in their daily life and socio-economic activities; this with a view to obtaining the adhesion of all, in a sustainable development perspective.

Concerning public consultations, they will take place in the boroughs concerned by the projects. These public consultations are initiated to present the project to the populations, to make them understand the merits of the presence of the different teams in the field but also to explain the negative impacts that such a project could have. They will also provide an opportunity to gather their concerns so that they can be taken into account in the analysis of impacts and proposals for mitigation and compensation measures.

## 6.6. Methodology for impacts identification

The environmental impacts of a project will be identified by analyzing the interactions between each of the equipment to be installed or activities to be carried out and the environmental components of the environment. The planned equipment and activities are therefore considered as sources that may cause changes to one or more environmental components likely to be affected.

These impacts will be identified on the basis of a matrix inspired by Leopold's (1971), according to the different phases of a project: the preparatory phase, the construction phase and the operation phase.

The analysis of environmental impacts will then be carried out in two stages. First, the impact factors will be identified before the consequences of these factors on the environment are assessed.



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Mitigation measures are defined as all the means considered to prevent or reduce the significance of environmental impacts. The study will provide a list of actions, structures, devices, corrective measures or alternative management methods that are applied to mitigate or eliminate the negative impacts of the project. Measures to maximize positive impacts will also be highlighted.

These measures may be general or specific. General measures are intended to mitigate the negative impacts of a project as a whole. Specific measures are aimed at mitigating the impacts on a particular component of the environment.

All mitigation measures will be included in the ESMP.

## 7. Study timing

The consultancy firm proposes to carry out the study within 2 months from the submission of the Terms of Reference to the administration.

## 8. Consultant's mandate and expected results

At the end of the mission, the consultancy firm shall make available to the client and to ABE, the ESIA and ESMP reports and all their annexes.

## 9. Study team

For the achievement of the Project, the consultancy firm has recruited a team composed of the following profiles:

- A project manager whose mission will be to coordinate the environmental and social teams and to ensure the quality control of the deliverables produced.
- A team of environmentalists (Master II (Professional) in Environmental and Social Assessment). They are in charge of:
  - The collection of environmental data;
  - Coordinating the production of all deliverables;
  - The writing of the following parts: project description, environmental and social issues, legal framework, impacts, mitigation measures, ESMP in accordance with the format of ABE;
  - Participation to all validations;
  - The resumption of the reports on their sections.
- A sociologist expert will be in charge of:
  - Supervision and collection of social data;





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- The writing and supervision of the writing by the team of all the social component in all the deliverables;
- The participation in all the validations;
- The resumption of reports on its sections.
- Two expert cartographers who will be in charge of:
- The production of all the project's cartography;
- The resumption of the reports on their sections.

Support staff will be responsible for the collection of environmental and social data. They will also contribute to the writing of the report on specific sections under the supervision of the environmentalists and the sociologist expert.

## 10. Content and presentation of the ESIA report

In accordance with Article 36 of decree n°2017-332 of 06 July 2017 on the organization of environmental assessment procedures in Benin, the comprehensive EIA report shall include at least the following elements:

- A non-technical summary;
- A comparative analysis of the options, alternatives or variants for the achievement of the objectives pursued by the project proposal, and the justification of the chosen alternative or variant (the project);
- A detailed description of the project (alternative or variant selected), including relevant plans, maps and figures and environmental aspects;
- Analysis of the legal and institutional framework of the project;
- Analysis of the foreseeable potential direct, indirect and cumulative impacts of the project on the environment and the lives of the population; Description and analysis of the initial state of the site, its natural and human environment, including natural resources, built environment, population and activities, climate change issues, human rights, cultural heritage, likely to be affected by the project and the use made of these resources;
- The analysis of the potential foreseeable direct, indirect, cumulative and residual impacts of the project on the environment;
- The analysis of technological risks, if any;
- Summary of public participation (consultations, public hearing);
- The Environmental and Social Management Plan (ESMP), including, as applicable:
  - The proposed measures to avoid, mitigate, cancel, compensate for negative impacts and risks;
  - The measures proposed to maximize or enhance the positive impacts and opportunities offered by the project;



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- General environmental and social clauses applicable on the construction sites, including occupational health and safety issues;
- The awareness program for employees and local populations on STDs, HIV and responsible behavior;
- The risk prevention and management program, if applicable;
- Biodiversity compensation and habitat restoration programme, if applicable;
- The mechanism for the management of incidental discoveries of archaeological and cultural heritage remains, and/or the cultural heritage resource management programme, if applicable;
- The overall budget for the implementation of the ESMP.

## Annex III **Stakeholder Engagement Plan (SEP)**

## Republic of Benin

# Environmental and Social Impact Assessment for the Development and Servicing Project of the Industrial Zone of Glo-Djigbe in the Municipalities of Tori-Bossito and Ze

## Stakeholder Engagement Plan



Report n°103146/D – 20<sup>th</sup> of November 2020

Supervised by Armeline DIMIER – + 33 6 20 86 00 65 – [armeline.dimier@anteagroup.com](mailto:armeline.dimier@anteagroup.com)



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## 1. Introduction

With a view to increasing its industrial potential and diversifying its sources of income, the Republic of Benin has decided to join forces in 2019 with Arise, a pan-African company specializing in the development of special economic zones, to develop an industrial zone adjacent to the site of the future Glo-Djigbe international airport.

The industrial zone of Glo-Djigbe, hereafter referred to as ‘the Project’ or ‘Glo-Djigbe IZ’ or ‘GDIZ’, aims at the establishment of agro-industrial units of diverse nature and importance, ranging from commercial units to small and medium-sized industrial units.

GDIZ will be located about 30 km from Cotonou, as shown on the project location map below.



Figure 1 : Location map of the project area

It will be positioned on the territory of 2 municipalities, Tori-Bossito and Ze in the Atlantic Department.

The project will cover an area of 1,462 ha. It will be carried out in 3 phases spread over 8 years: a first phase, covering 313,97 hectares and developed within 2 years, a second phase developing another 374,38 ha in 3 to 5 years and a final phase adding 773,59 ha in 6 to 8 years.

The construction of this industrial zone and its subsequent operation are likely to have both positive and negative impacts on the environment and the populations concerned. It is thus required, in accordance with the Beninese regulation and the International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability - to which the promoter abides by - to carry out an Environmental and Social Impact Assessment.

Arise contracted the international environmental consultancy firm Antea France to conduct the Environmental Impact Assessment (EIA) for the Project in line with national regulatory requirements for local permitting purposes. This national EIA was conducted between October 2019 and February 2020 and approved by the Benin Environmental Agency on the 5<sup>th</sup> of April 2020 with the issuance of the “*Certificat de conformité environnementale*” or Environmental Compliance Certificate (ECC).

In August 2020, Arise contracted Antea France to perform the Environmental and Social Impact Assessment (**ESIA**) for the Project complying with the IFC Performance Standards. According to these standards, an ESIA goes hand in hand with a Stakeholder Engagement Plan. This report is the Stakeholder Engagement Plan for the GDIZ project.

## 2. Presentation of the Stakeholder Engagement Plan

### 2.1. Scope

The Stakeholder Engagement Plan (SEP) provides GDIZ with a strategy for engaging stakeholders at different stages of the project life cycle. It is an essential tool to manage communications with stakeholders in order to ensure that the project obtains and maintains a broad community support. The SEP will also guide procedures for managing claims raised by local communities and other types of stakeholders.

The SEP takes into account the socio-economic and cultural characteristics of the project area with the aim of creating an atmosphere of understanding and trust. It allows for the active involvement of those affected by the project and other stakeholders, providing these groups with enough opportunities to express their opinions and concerns about the project.

It is a dynamic document where engagement and communication actions should be reviewed and updated according to the results obtained after the implementation of the various actions of the plan of the ESIA and ESMP and depending on the priorities and important events in the life of the project.

The SEP focuses on the stakeholders directly affected by the project, specifically the users of the project site and the inhabitants of the villages bordering it, namely 8 villages:

- in the municipality of Tori-Bossito, district of Tori-Cada: Dokanme, Gbetaga, Sogbe and Zebe;
- in the municipality of Ze, district of Tangbo-Djevie: Agbodjedo, Anavie, Djitin-Aga and Houeze.

It also considers the stakeholders, at a national as well as local level, who might express an interest or feel concerned by the project.

### 2.2. Objectives of the Stakeholder Engagement Plan

The specific objectives of this SEP are as follows:

- identify the **key stakeholders** affected and/or able to influence the project and its activities;
- assess the **level of interest** and commitment of stakeholders and **take their views into account** in the design of the project and its environmental and social performance;
- identify the **most effective methods for disseminating project information** and ensuring regular, accessible and transparent consultations;
- guide GDIZ in building mutually **respectful, beneficial and sustainable relationships** with relevant stakeholders;
- establish a **formal and transparent dispute resolution mechanism**;
- define **roles** and **responsibilities** for the implementation of the SEP;
- define **reporting** and **monitoring** measures to ensure the effectiveness of the SEP and periodic reviews of the SEP based on the results.

The implementation of the SEP is expected to produce the following results:

- **community trust and ownership of the project** will be strengthened;
- the **participation of affected communities** will be active;

- a sense of **shared ownership and responsibility** for project results will be created;
- claims resolution mechanism will be perceived as **reliable** and **responsive**.

## 2.3. Organization of the report

The Stakeholder Engagement Plan is structured as follows:

- Chapter 1 Introduction;
- Chapter 2 Regulatory framework and commitment principles;
- Chapter 3 Stakeholder mapping;
- Chapter 4 Summary of engagement activities;
- Chapter 5 Engagement strategy;
- Chapter 6 Claim management mechanism;
- Chapter 7 Implementation of the Stakeholder Engagement Plan.



## 3. Regulatory framework and commitment principles

### 3.1. Regulatory consultation requirements

#### 3.1.1. Legal framework for environmental assessment

All construction or public development projects in Benin are subject to laws and regulations to protect the quality of the country's environment.

The obligation to carry out an ESIA is based on the Framework Law on the Environment (98-030 of 12 February 1999) of the Republic of Benin, which, inter alia, in Title V, Chapter I, Article 87-93, imposes the impact assessment procedure.

The concerned projects and the rules of procedure for ESIA were adopted by the **Decree No. 2017-332 on the organization of environmental assessment procedures in the Republic of Benin**. This procedure requires any project owner whose project has consequences on the environment, whether these occur in high-risk or ecologically sensitive areas, to first obtain an Environmental Conformity Certificate (ECC) from the Minister responsible for the Environment, after technical advice from the Benin Environmental Agency (ABE).

**Based on its expected environmental and social impacts, GDIZ project requires a thorough ESIA which has already been prepared and validated by ABE on the 5<sup>th</sup> of April 2020.**

#### 3.1.2. Public consultation during the environmental assessment

Article 3-d. of the Framework Law on the Environment in Benin stipulates that "the various social groups must intervene at all levels in the formulation and execution of national environmental policy; this principle is crucial in the fight against poverty and promotes the country's development".

In this context, the **General Guide to Conducting an Impact Assessment**, drawn up by ABE, establishes public participation as an essential phase of the administrative procedure of environmental assessment.

This participation is required insofar as the impact study alone cannot determine precisely what is desirable or a priority for the stakeholders in a project and, above all, for the people affected by it. Similarly, the impact study cannot define what are the "collective values that must be considered in decision-making".

Public participation must therefore make it possible to respond to these imperatives by providing access to information about the project and by giving people the opportunity to express their opinions and present their wishes and expectations. It also makes it possible to identify the potential unforeseen consequences of the implementation of a project and thus to avoid them at an early stage, minimizing environmental and social costs.

It therefore follows from the provisions of the legal texts that frame the ESIA in Benin that the public consultation process is important, just as much as the consideration of the perceptions and opinions expressed by the communities consulted by the promoter.

However, Benin regulations do not specifically provide a framework for public consultation during the environmental assessment process. It only establishes a public hearing procedure that must be carried out once the environmental and social impact study has been submitted to the ABE for review.

### 3.1.3. Public hearing procedure

The public hearing procedure in Benin was instituted by the Framework Law on the Environment No. 98-030 of 12 February 1999. It was reinforced and specified in Decree No. 2017-332 of 6 July 2017 on the organization of environmental assessment procedures in the Republic of Benin and its Title V relating to the **public hearing on the environment**.

The latter decree defines the objective of the hearing, which is to "involve citizens in the decision-making process relating to the implementation of projects likely to have an impact on their living environment and to facilitate government decision-making. It provides citizens with access to information and allows them to ask questions about the project or express their opinions" (art. 52). Under these various texts, the following is subject to the public hearing procedure:

- any project to classify establishments or sites;
- any program or project where the Minister deems *a priori* that it is in the interest of the citizens concerned or where he considers that the project involves risks (art. 53).

Nevertheless, an impact study file is not systematically the subject of a public hearing. On the contrary, the decision to hold a hearing is initiated under 2 conditions (art. 54):

- where, in deciding on an EIA file, the Minister deems it necessary to obtain the opinion of citizens in order to inform his decision;
- upon request addressed to the Minister within 15 days after making the draft EIA report public.

This request can then come from an administrative authority, a decentralized structure, a non-governmental organization or a citizen interested in the project. It must be accompanied by a justification file (reasons for the request and interests in relation to the environment affected by the project). This justification is necessary to avoid abusive use of the public hearing, which represents an important means of public participation in decision-making. While the public hearing is indeed an effective means, it is costly in time, money and effort for the proponent, government agencies, citizens, groups or municipalities who participate in the hearing.

The Minister then forwards the application to all structures interested in the project and the ABE for the purpose of obtaining a technical opinion that may justify its acceptance or rejection. Acceptance of the application leads to the organization of the public hearing by order. A copy of the decree is sent to the promoter as well as to the applicant and the structures territorially concerned.

This decree contains the following elements:

- the subject matter of the public hearing;
- the dates and places scheduled for the hearings;
- the composition, terms of reference and list of members of the hearing panel responsible for conducting the environmental public hearing procedure;
- the location and times at which the public may consult the project file.

The population is informed of the holding of a public hearing by the publication of the decree in the Official Gazette, through the press and by public posting in the structures territorially concerned by the project.

After publication of the decree, the procedure (art. 59) details the time limits that must be respected, namely:

- 8 days after the publication of the order for the public availability of the hearing file;

- 15 days after the file is made available for the first hearing session;
- 10 days after the first session for the second hearing session;
- 10 days after the last hearing session for delivery of the Hearing Report to the Minister.

The Public Hearing Commission is responsible, on behalf of the Minister, for conducting meetings and consultations as part of the proceedings.

The commission is composed of 3 members, including a government official, an environmental specialist and a representative of non-governmental organizations. The chairman of the Commission, chosen from among the 3 members appointed by the Minister, conducts the public hearings, seeking the cooperation of the local authorities, which are required to provide it.

The Hearing Commission is responsible for publicizing the Notice of Hearing, preparing and facilitating the consultation sessions, gathering the views of participants and preparing the Hearing Report for the Minister.

The hearing is then conducted in 3 phases:

- 1) **preparation**, during which the Commission shall set a timetable and formats for the hearing;
- 2) **the conduct of the hearing**, during which a briefing and investigative session is held followed by an argument session;
- 3) **the drafting of the hearing report**, which is sent to the Minister and then made public.

The hearing report is written by the members of the Commission and must include:

- the reminder of his mandate included in the order prescribing the public hearing;
- the conditions for the conduct of the hearing (location, number of persons, number of sessions, briefs, oral presentations, answers to questions, expert opinions received, etc.);
- the summary of the hearing debates after analysis of the points of view of citizens and groups, taking into account data relating to the project and the environment and;
- the Commission's recommendations, whether or not they are favourable to the project, all in accordance with Article 18 of the decree on public hearings.

All documents relating to the hearings (written or recorded notes during meetings, exhibits, written depositions) are labelled, numbered and collected in a sealed package deposited with the Minister in charge of the Environment who assigns it to the ABE for archiving.

The hearing report is signed by all members of the hearing committee and then edited in ten copies. The Minister has 15 days to make the report public.

The time limit for the Public Hearing Panel to hold a public hearing and report is 45 days from the date the Order prescribing the public hearing was made public.

### 3.2. IFC Performance Standards

The IFC Performance Standards (PS) contain a set of requirements for stakeholder engagement in terms of information disclosure, grievance mechanism, participation, consultation and consent. PS 1 emphasizes the following aspects:

- Ensure that persons likely to be affected by the Project or who may have an interest in it, are involved as stakeholders, with particular attention to vulnerable and/or disadvantaged groups.

- Manage external communication so as to reach the relevant stakeholders and facilitate dialogue between the project and these stakeholders.
- Tailor stakeholder engagement to the specificities of the project and those of the affected communities, ensuring that an effective information and consultation approach adapted to the local context is implemented.
- Disseminate relevant information relating to the project to help stakeholders understand the related risks, impacts and opportunities. These include issues relating to the objective, nature, scale, duration of the Project, the potential associated environmental and social impacts as well as the proposed mitigation measures, the stakeholder engagement process and the project's claims and grievance mechanism.
- Ensure that a dual process of information and consultation is carried out from the start of the planning phase of the project with all relevant stakeholders; that it is conducted in a culturally appropriate manner, free from intimidation or coercion; and that it is duly documented; and that the stakeholders are able to express their opinion and that this latter is truly taken into account by the project.

The other Performance Standards also all have, except for PS 3 on Resource Efficiency and Pollution Prevention, requirements relating to stakeholder engagement by topic. Guidance Notes (GNs) complement these performance standards, providing details on the requirements they contain.

The guidebook entitled *"Dialogue with stakeholders. The Best Practices Handbook for Companies Doing Business in Developing Markets"*, published in May 2007 by the IFC, also provides information on good practices for managing relationships with stakeholders in a dynamic context. This manual only concerns stakeholders "external" to the business operation, such as local communities, local authorities, non-governmental organizations (NGOs) and other affected or interested stakeholders; it does not deal with engagement with suppliers, contractors, distributors or customers.

### 3.3. Principles of the commitment

Within the framework of the proposed Stakeholder engagement plan, the promoter will comply with the following principles in the design and implementation of its information and consultation actions:

- **compliance with the requirements of Beninese legislation and good international practice;**
- participation is **free** (without coercion), **informed** (relevant information made available before or during the consultation), and **prior to the taking of relevant decisions;**
- understanding of **engagement as a dialogue between the project proponent, affected communities and other stakeholders** throughout the project cycle (design, construction, operation);
- inclusion in the process of all the stakeholders identified in this plan, and application of the principles of **non-discrimination** and **transparency;**
- **inclusion of groups likely to be marginalized** on account of gender, poverty, educational profile and other elements of social marginality, ensuring them equitable access to information and the opportunity to make their opinions and concerns known;
- effective inclusion of **stakeholders' concerns, fears, contributions, and grievances** in decisions relating to the Project;
- claims management in a **timely, balanced and effective manner.**

The following figure describes the overall process of managing engagement with stakeholders from their identification to the establishment of a sustainable dialogue.

The process is circular because it is adaptive, with the promoter having to constantly renew his or her knowledge and understanding of stakeholders in order to cope with the changes inherent in organizations and institutions (changes in personnel, reorientation of strategies towards the project, elections, emergence of new organizations, etc.).

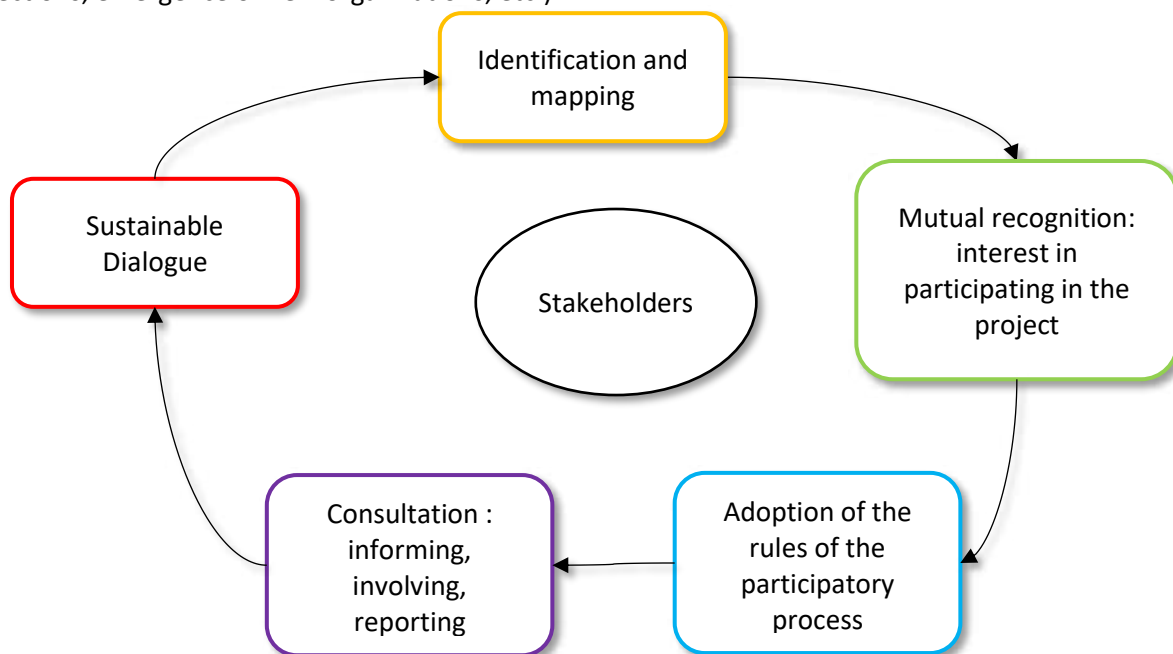


Figure 2: Stakeholder engagement cycle

## 4. Stakeholder mapping

### 4.1. Identification and categorization of stakeholders

Stakeholder identification is the first step in any process of engagement and dialogue in the development of new projects.

It is imperative for a project developer to identify all the actors, organizations and groups of individuals who could be directly concerned or interested in its project. He must also understand their positioning, expectations and fears in order to identify what could represent an opportunity or a threat to the project. The proponent will thus be able to distinguish the stakeholders who can facilitate the project and whose support is required from those who can block it and require strategic engagement actions (consultation, mediation, etc.).

The identification of stakeholders will guide the whole engagement strategy that must be deployed to guarantee the success of the project.

Several criteria were used to proceed with this identification:

- the nature of the project activities;
- its location and zones of influence, i.e. the geographical areas in which the project is likely to cause impacts;
- the nature of the potential impacts, and consequently, the groups of individuals, governmental or non-governmental institutions that may be affected by the project or have an interest in the site and/or the project;
- the interests and expectations of stakeholders expressed during the meetings and interviews conducted for the ESIA.

The work of identifying and categorizing the stakeholders first consisted in establishing 3 main categories: **authorities, private sector and civil society**. Subsequently, groups of stakeholders, categorized according to their sector of intervention, their issues or interests vis-à-vis the project, were established. The sections below provide more details on the categories and groups of stakeholders that have been identified for the project.

The organizations belonging to these groups, where possible, have been identified in a list of stakeholders produced in an Excel file. This list, presented in § 4.1.5, was established on the basis of current knowledge of the project, of its stakeholders and thanks to the numerous field visits carried out within the framework of the ESIA. It can be updated periodically, because the identification of stakeholders, especially those who at this stage remain unknown, will be done continuously throughout the project.

#### 4.1.1. Authorities

The authority's category brings together both the national authorities and the local authorities who are generally involved continuously or sporadically in the implementation of the project, whether through the issuance of permits or authorizations or the environmental and social monitoring of the project in construction and operation phases. These stakeholders are often important for the promoter because their actions condition the smooth running of the project and the good management of environmental and social impacts.



They mainly belong to the following groups:

- the **ministries** in charge of the development of the project and the implementation of its main components (land tenure through the release of rights-of-way, water and electricity supply, etc.);
- **government institutions**, including the directorates, agencies, institutes and deconcentrated services of the administration which will intervene at different levels and according to different schedules to support the implementation of the project with their expertise. Included in this category are institutions that ensure the promotion of agriculture, livestock and fisheries, protection and control of natural resource use (fauna, flora), land management, infrastructure construction, environmental protection, industrialization, energy, water, community health and safety, human welfare, social protection and employment, etc.
- **local authorities** (the mayors of Tori-Bossito and Ze and the district chiefs of Tangbo-Djevie and Tori-Cada) and the **8 village chiefs and their councils** (religious and traditional chiefs), who will lose management of their rural and communal territories which the State intends to acquire for the project. Although they are administratively under the responsibility of ministerial authorities, they could play a role of facilitator of the project towards the communities.

#### 4.1.2. Private sector

The private sector's category brings together companies and socio-professional organizations that could have direct interests in the implementation of the project (contracts, economic benefits, etc.) or that may want to engage in the defence of the rights of workers on the construction site or on GDIZ or defend farmers who will lose arable land.

The promoter may have to interact with these stakeholders in order to obtain information or to coordinate the management of certain impacts. He could also recruit them as contractors for the project or integrate them into the industrial platform.

Interested stakeholders include, but are not limited to:

- **the future investors (such as international lenders or private banks)** likely to become potential project partners;
- **construction companies, suppliers of services, goods and materials** that will be involved or interested in the construction site;
- **the future operators/industries settled** in the Glo-Djigbe Special Economic Zone and **enterprises** wishing to set up in GDIZ (textiles, agriculture);
- **enterprises and farmers** specialized in cotton and cashew nut cultivation, who will be indirectly affected by the project;
- **the promoters of the Glo-Djigbe airport:** the Development Authority for the Perimeter of Glo-Djigbe (ADPG) and Paris Airport (ADP), as well as the company that will be in charge of building the future airport;
- **the surveyors and architects** in charge of urban planning and subdivision in the 2 municipalities of the project area: Cabinet ECO-PLAN, Cabinets CETAFE, ADEYE and TOPO VISION 10, Cabinet BENIN TOPO FONCIER;
- **real estate developers** who have acquired land on the project site and have proceeded with its division and sale, and purchasers of such land. Two promoters have invested in the area: the Bank of Africa, which developed the BOA city, and AGETIP Benin SA;

- **trade union and socio-professional organizations** (General Confederation of Benin Workers, National Union of Benin Workers' Unions, Confederation of Autonomous Trade Unions of Benin) which could intervene in the defence of workers' rights through trade union actions;
- **associations of pineapple producers** (National Association of Pineapple Exporters of Benin, Benin Pineapple Producers Network) at national level and local level (AisSogbe, Alafia, CVPA, AJASDM in Tangbo-Djevie, ADOKPE, AÏDOTE in Tori-Cada)
- **local producers and traders** who could benefit from small contracts with GDIZ for the supply of goods or services or develop services in the area adjacent to the site for site workers (catering, small business, etc.).

#### 4.1.3. Civil society

Civil society's category brings together both people and village communities directly affected by the project, that is to say holding property on the project site: agricultural land, houses, businesses, or individual or collective cultural heritage.

This category also includes customary authorities such as religious or traditional leaders, local and village associations as well as residents of the project site who could suffer impacts in the form of nuisances. Finally, it includes civil society organizations engaged in environmental protection, social actions and the media.

As part of the project, the following were identified as stakeholders from civil society:

- **persons who have their residence** (dwelling house) on the project site, who will be **physically moved** (approximately 50 buildings are estimated to be on the site, the residential use is not yet known to all);
- **persons owning land, buildings** (other than houses) or **agricultural property** on the project site and who will be **economically displaced**. These persons include owners of cultivated land, land parcels, farmers who do not own their land, farm workers, etc.;
- persons or groups/communities whose cultural heritage is affected by the project;
- **the residents of the 8 villages** surrounding the project site who will be affected by the potentially negative environmental and social impacts identified by the project ESIA (various nuisances, increased road traffic, spontaneous social influxes, etc.);
- the residents of these 8 villages and other villages in the communes of Ze and Tori-Bossito who will benefit from employment on the project site, as well as the entrepreneurs and traders in these communes who will benefit from the positive impacts of the project;
- **workers and employees** on the project site from other municipalities than those of Ze and Tori - Bossito;
- **migrants attracted** by the project in the hope of obtaining employment before the start of the works. This group could be made up of people of Beninese or non-Beninese nationality (Maliens, Burkinabe, Togolese) from other parts of the country, especially unemployed young people attracted by the prospect of employment.
- **civil society organizations** that could commit themselves to defend the interests of the communities affected by the project or that could become partners of GDIZ in the implementation of the project in order to get involved in the organization and implementation of social mediation, in the process of dispute management, to support the implementation of the stakeholder engagement plan or to intervene in awareness raising activities on themes such as HIV/Aids;

- **the media** and associated interest groups, including the spoken, written and audio-visual media: town criers, local and national radio stations, local and national television channels, print and web media.

#### 4.1.4. Vulnerable groups

It is particularly important to identify individuals and groups who may have more difficulties in participating in the consultation process, as well as those who may be unequally or disproportionately affected by the project due to their marginalized or vulnerable situation.

For these groups, different or distinct forms of mobilization should be considered. Thus, the management of vulnerable persons requires special engagement efforts to ensure their equal representation in the consultation and decision-making process associated with the project.

The main groups that have been identified in the study area are listed below.

- **Persons with physical or mental disabilities** (PWDs) such as cerebral palsy, amputees, paralysed persons, amblyopic persons, blind persons, hearing-impaired persons, deaf persons, mute persons, persons with Down's syndrome, mentally ill persons, mentally retarded persons.
- **Children under 14 years of age**, who are not in school or who have dropped out of school. These children are exposed to trafficking and economic exploitation through underage work. This is the case of child slaves also called "*vidomegons*" or "placed children" in English. These are children from poor families, placed in well-off families in order to benefit from an education in exchange for domestic chores, but who are often out of school and work in conditions close to slavery.
- **Orphans**: according to Ze local development plans, there is an important number of orphans in the municipality who live in complete deprivation.
- **Elderly**: Ze PDC underlines that elderly are also among the vulnerable groups because they are often abandoned by their relatives, becoming undernourished and living in squalid conditions. Elders suffer from a weakening of family bonds which indicates strong changes in traditional community cohesion. Elders are indeed usually cared for by their children and other relatives but those increasingly decide to stop the care for financial reasons, and resort to accuse the elder of witchcraft to justify the abandonment.
- **Women-headed households and widows**: young mothers are particularly exposed, suffering from abandonment from their spouse because of unemployment, alcoholism and domestic violence. Widows also suffer from a grabbing of their goods by their husband's relatives.
- **Very poor households**: these households do not have enough financial resources, which often lead them to deschool their children, especially young girls which are forced to enter marriage rapidly so that they cease to be a financial burden to their parents.

#### 4.1.5. Summary list

In total, 93 stakeholders have been identified for the project. The number of stakeholders by category is presented below:

- **Authorities : 55**
- **Private sector : 14**
- **Civil society : 24**

The table below presents stakeholders in each category.

**Table 1 : Stakeholder List**

N.	Category	Sub-category	Stakeholder	Abbreviations	Main working area
1	Authority	Ministries	Ministry of the Living Environment and Sustainable Development	MCVDD	
2	Authority	Public agency	Beninese Environment Agency	ABE	Environment
3	Authority	Public agency	National Geographic Institute	IGN	Land
4	Authority	Ministerial direction	General Directorate for Habitat and Construction	DGHC	Habitat
5	Authority	Ministerial direction	Departmental Direction for the Living Environment and Sustainable Development for Atlantic/Littoral	DDCVDD	Environment
6	Authority	Ministerial direction	General Directorate of Water, Forests and Hunting	DGEFC	Environment
7	Authority	Deconcentrated State service	Forestry inspectorates at department level		Environment
8	Authority	Ministries	Ministry of Agriculture, Animal Husbandry and Fisheries		
9	Authority	Ministerial direction	Departmental Directorate of Agriculture, Animal Husbandry and Fisheries for Atlantic/Littoral	DDAEP	Agriculture
10	Authority	Ministries	Ministry of Economy and Finances	MEF	
11	Authority	Public agency	National Agency for Domain and Land	ANDF	Land
12	Authority	Ministries	Ministry of Infrastructure and Transport	MIT	
13	Authority	Ministerial direction	General Directorate of Land Transport		Transports
14	Authority	Deconcentrated State service	Departmental Directorate for Infrastructure and Transport for Atlantic/Littoral		Transports
15	Authority	Public agency	National Road Safety Centre	CNSR	Safety
16	Authority	Ministries	Ministry of Industry and Trade		
17	Authority	Deconcentrated State service	Departmental Direction of Industry and Trade of Atlantic/Littoral		Economic development
18	Authorities	Ministries	Ministry of Labour, Public Function and Social Affairs		
19	Authority	Deconcentrated State service	Labor inspection services		Labor Law
20	Authority	Public agency	National Social Security Fund	CNSS	Health
21	Authority	Ministries	Ministry of Water and Mining		
22	Authority	Public establishment (structure under supervision)	National Water Company of Benin	SONEB	Water
23	Authority	Ministries	Ministry of Energy		
24	Authority	Public establishment (structure under supervision)	Beninese Electric Power Company	SBEE	Energy

N.	Category	Sub-category	Stakeholder	Abbreviations	Main working area
25	Authority	Ministries	Ministry of the Interior and Public Security		
26	Authority	Security institution	Republican Police		Safety
27	Authority	Security institution	National Fire Brigade Group	GNSP	Safety
28	Authority	Ministries	Ministry of Health		
29	Authority	Ministerial direction	Departmental Directorate of Health for Atlantic/Littoral	DDS-AL	Health
30	Authority	Health institution	Area hospital Allada-Ze-Toffo		Health
31	Authority	Health institution	Municipality Health Centre of Ze	CsCOM	Health
32	Authority	Health institution	District Health Centre of Tangbo-Djevie	CSA	Health
33	Authority	Health institution	Centre for social promotion of Ze	CPS	Health
34	Authority	Health institution	Area hospital Ouidah Kpomassè Tori-Bossito		Health
35	Authority	Health institution	Municipality Health Centre of Tori-Bossito	CsCOM	Health
36	Authority	Health institution	District Health Centre of Tori-Cada	CSA	Health
37	Authority	Health institution	Centre for social promotion of Tori-Bossito	CPS	Health
38	Authority	Ministries	Ministry of Tourism, Culture and Arts		
39	Authority	Ministerial direction	National commission on the protection of cultural heritage		Cultural heritage
40	Authority	Deconcentrated State service	Departmental Directorate for culture, leisure and sports		Cultural heritage
41	Authority	Ministries	Ministry of Decentralization and Local Governance		
42	Authority	Local public authority	Prefect of the Atlantic Department Prefecture		Governance
43	Authority	Local public authority	Mayor of Ze municipality		Governance
44	Authority	Local public authority	Head of district of Tangbo-Djevie		Governance
45	Authority	Local public authority	Head of village of Sogbé		Governance
46	Authority	Local public authority	Head of village of Dokanme		Governance
47	Authority	Local public authority	Head of village of Gbetaga		Governance
48	Authority	Local public authority	Head of village of Zébè		Governance
49	Authority	Local public authority	Mayor of Tori-Bossito municipality		Governance
50	Authority	Local public authority	Head of district of Tori-Cada		Governance
51	Authority	Local public authority	Head of village of Agbodjedo		Governance
52	Authority	Local public authority	Head of village of Anavié		Governance

N.	Category	Sub-category	Stakeholder	Abbreviations	Main working area
53	Authority	Local public authority	Head of village of Houeze		Governance
54	Authority	Local public authority	Head of village of Djitin-Aga		Governance
55	Authority	Public establishment (structure under supervision)	Development Authority of the Glo-Djigbe Perimeter	ADPG	Economic development
56	Private sector	Private company	China Airport Construction Group Corporation	CACGC	Economic development
57	Private sector	Private company	Paris Airports	ADP	Economic development
58	Private sector	Private company	Cabinet ECO-PLAN		Economic development
59	Private sector	Private company	Cabinets CETAFE, ADEYE et TOPO VISION 10		Economic development
60	Private sector	Private company	Cabinet BENIN TOPO Land		Economic development
61	Private sector	Private company	Bank of Africa	BOA	Economic development
62	Private sector	Private company	AGETIP Bénin SA		Economic development
63	Private sector	Lenders	African Development Bank/ IFC/World Bank		Economic development
64	Private sector	Socio-professional organizations	General Confederation of Workers of Benin	CGTB	Labor Law
65	Private sector	Socio-professional organizations	National Union of Workers' Unions of Benin	UNSTB	Labor Law
66	Private sector	Socio-professional organizations	Confederation of Autonomous Trade Unions of Benin	CSA	Labor Law
67	Private sector	Socio-professional organizations	National Association of Pineapple Exporters of Benin	ANEAB	Economic development
68	Private sector	Socio-professional organizations	Benin Pineapple Producers Network	REPAB	Economic development
69	Private sector	Socio-professional organizations	Local associations of pineapple producers		Economic development
70	Civil society	International NGO	AIDE and ACTION		Solidarity
71	Civil society	International NGO	OXFAM QUEBEC		Solidarity
72	Civil society	International NGO	CARITAS BENIN		Solidarity
73	Civil society	International NGO	UNICEF		Solidarity
74	Civil society	National NGO	Research and support group for new development initiatives	GRAIND	Solidarity
75	Civil society	National NGO	DEDRAS		Solidarity
76	Civil society	National NGO	PeACE ONG		Solidarity



N.	Category	Sub-category	Stakeholder	Abbreviations	Main working area
77	Civil society	National NGO	Beninese Center for the Environment and Economic and Social Development	CEBEDES	Solidarity
78	Civil society	Radio	Radio Bénin Atlantic FM Radio Parakou BBC WS Africa RFI Afrique		Information
79	Civil society	Radio	La voie de la Lama		Information
80	Civil society	TV	ORTB Télévision nationale Bénin Business 24		Information
81	Civil society	Press	Le Progrès L'Evènement précis La Presse du jour Le Nouvel observateur Le Pays émergent		Information
82	Civil society	Web media	Online press: <a href="https://www.24haubenin.info/">https://www.24haubenin.info/</a> <a href="https://beninwebtv.com/benin/">https://beninwebtv.com/benin/</a>		Information
83	Civil society	Local associations	Tori-Cada Craftsmen Associations		Solidarity
84	Civil society	Local associations	Tori-Cada Women's Associations		Solidarity
85	Civil society	Local associations	Tori-Cada Youth Associations		Solidarity
86	Civil society	Local associations	Tori-Cada Farmers Associations		Solidarity
87	Civil society	Local associations	Municipal Unions of Producers Tori-Bossito	UCP	Solidarity
88	Civil society	Local associations	Communal Unions of Women's Groups Tori-Bossito		Solidarity
89	Civil society	Local associations	Municipal association of disabled persons of Ze		Solidarity
90	Civil society	Local associations	Ze Craftsmen Associations		Solidarity
91	Civil society	Local associations	Tangbo-Djevie Women's Associations		Solidarity
92	Civil society	Local associations	Tangbo-Djevie Youth Associations		Solidarity
93	Civil society	Local associations	Tangbo-Djevie Farmers Associations		Solidarity

## 4.2. Prioritisation of stakeholders

The prioritization of stakeholders proposed here responds to one imperative: to structure the upcoming dialogue in order to obtain as quickly as possible the acceptance of the project by the local authorities and populations, while maintaining a high level of commitment from government authorities to ensure that the project progresses according to the planned schedule.

Stakeholders were classified according to two criteria conventionally used during stakeholder mapping exercises:

- Their **level of influence or power**, i.e. their ability to block or facilitate the project.
- Their **level of potential interest**, expectations or fears regarding the Project.

The rating scale is shown in the table below. The determination of the rating for each stakeholder is based on 2 approaches:

- **Empirical approach:** to determine the level of interest, the positions or opinions already expressed by the stakeholder publicly were studied. For the assessment of the level of influence, elements such as the hierarchical positioning of an authority, the international influence of an NGO or the connection of a local association with a larger network of influential actors are factual elements that have been used.
- **Expert opinion:** in the absence of information on opinions or positions already expressed by the stakeholder, the Consultant used his experience on other infrastructure projects to best assess the potential positioning of the stakeholder. Its expert opinion is based on an analysis of secondary sources and the knowledge of local issues acquired through past projects.

Table 2 : Criteria for assessing the levels of influence and interest of stakeholders

	INFLUENCE OR POWER	INTEREST
1	The stakeholder has very little influence.	The level of stakeholder interest is low or non-existent.
2	The stakeholder has little influence but presents a strategic interest for the project.	The stakeholder demonstrates interest in the project activities but is only slightly if at all impacted by the project.
3	The stakeholder can positively or negatively influence other key stakeholders and impact the project.	The stakeholder is impacted by the project but expresses limited interest, concerns or expectations.
4	The stakeholder can directly block operations and / or withdraw its social license to operate from the project.	The stakeholder is clearly impacted by the project and regularly expresses interest, concerns or expectations.

The result of the stakeholder classification is presented in the diagram below.

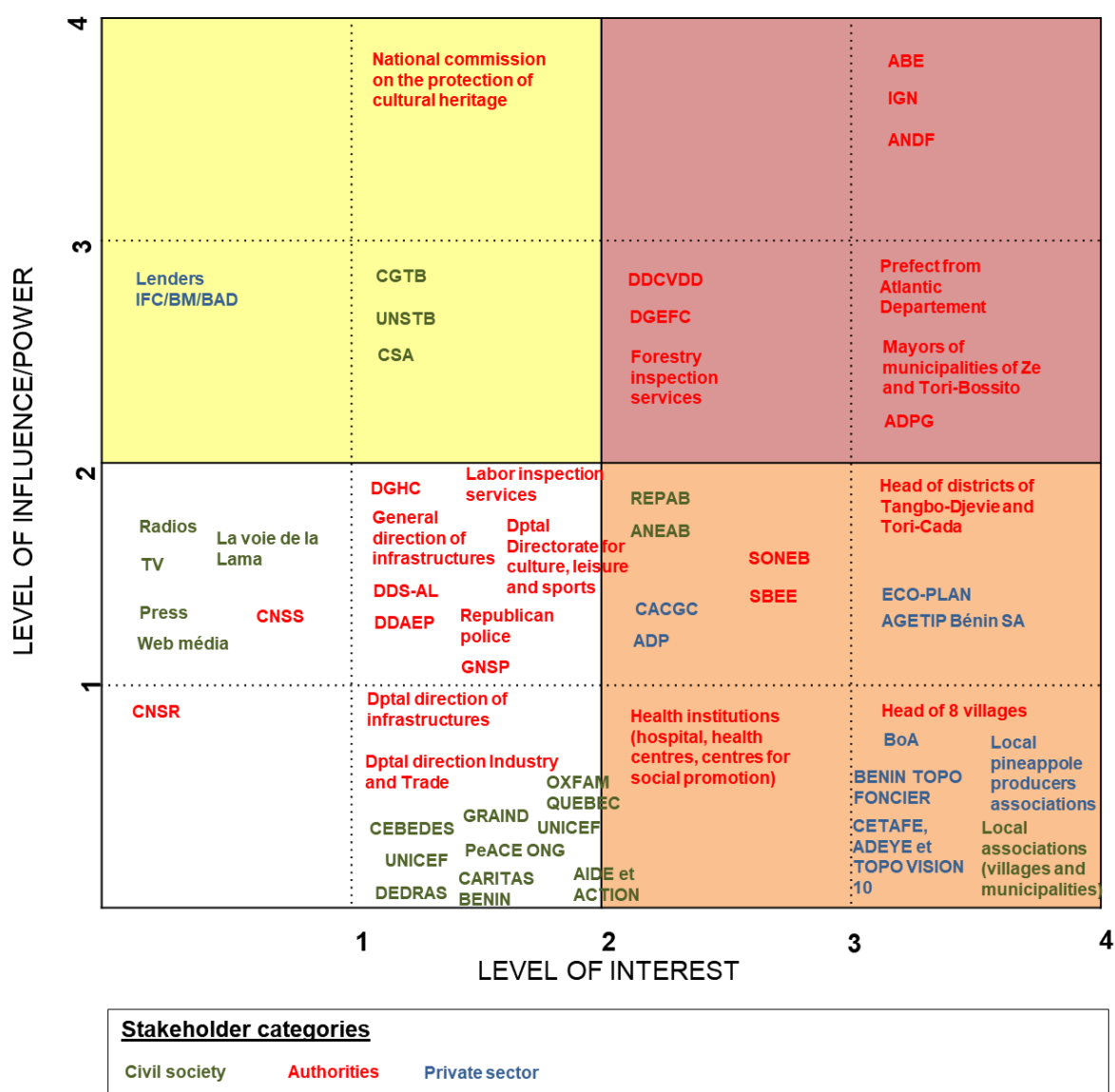


Figure 3: Stakeholder mapping

The stakeholders located in the red square are the priority stakeholders with whom it is imperative to engage and maintain a regular and structured dialogue in order to take into account their expectations and recommendations on the management of the project's impacts. These are stakeholders who can easily block the project in its proper course.

In the case of GDIZ project, these stakeholders are mostly national authorities in charge of delivering permits (environmental permits, permits to discharge waste waters or to drill boreholes for instance) or facilitating the land acquisition process. They are also local authorities who can be involved in the permitting process and support or not the project.

Stakeholders located in the orange square need to be listened to carefully to identify any major expectations or particular concerns about the project that would require adapting the operation of the project or reviewing the impact management strategy. Some of these stakeholders could be directly associated with the project and this strategy.

These stakeholders encompass in the present case the public and private infrastructures neighbouring the project, the district authorities, land promoters and developers that have stakes on the project site, the public companies that will provide dedicated services to the project (water, electricity), along

with local associations in the villages and municipalities who will be affected by the project but could also be partner to the mitigation measures implementation.

The stakeholders located in the yellow and white square should be subject to limited monitoring of their positioning in relation to the project to see if it is evolving and if some of these stakeholders show a new interest or opposition to the project.

This category encompasses the trade unions, media, general and departmental directions not directly involved in the project along with international and national NGOs having projects in the study area.

## 5. Summary of engagement activities

### 5.1. Objectives of the consultation process

Public consultation is an important and essential step in carrying out an environmental impact study because it will allow persons, groups or villages concerned by the project to have access to technical information, to express their opinions on the project and to highlight, among other things, the collective values that must be considered in decision-making.

Public consultation verifies that there are no unintended consequences for the implementation of a project, and as a result, it can avoid future expenses for environmental corrective measures. Public opinion therefore plays an important role in the environmental impact assessment process. It is separate from the public hearing procedure, which is a regulatory procedure allowing environmental authorities to ensure that the project does not raise any major objections and that the opinions of stakeholders have been taken into account in the impact study.

Public consultation, in the end, makes it possible to establish ownership and effective involvement of the project in all its phases, by the populations concerned and therefore to put in place the mechanisms that guarantee their social support, among others project.

For the GDIZ project, the consultation process took 2 forms:

- Preliminary consultations held with communities of the study area during the social field data collection.
- ESIA disclosure consultations.

### 5.2. Preliminary consultation process

#### 5.2.1. Activities carried out

As part of the baseline of the natural and human environment for the Environmental and Social Impact Assessment, Antea Group carried out consultations between November and December 2019 with the various stakeholders concerned by the project.

These meetings were carried out in order to collect technical, environmental and social data on the project area as well as to inform the stakeholders concerned and gather their opinions.

These consultations took the following forms:

- preparatory meetings and site visits with local authorities to show them the boundaries of the future site of the industrial zone;
- two public consultation meetings at the level of the 2 districts of the project study area;
- 22 discussion groups with different socio-professional and socio-demographic categories, aimed both at collecting socio-economic data and exchanging views on the project;
- individual interviews with key stakeholders to gain a good understanding of the functioning of the land tenure system in the project area and to identify constraints to land acquisition.

Due to opposition to the project, the village of Agbodjedo was not covered by the various consultation activities.

The table below presents the activities carried out.

**Table 3 : Summary of institutions and groups met**

Date	Locality	Institution or group met	Duration of the meeting	Number of Participants	Men/ Women
29 /10/2019 at 15h	Ze Municipality	Preparatory meeting with the Mayor of Ze	2h	3	1 man 2 women
30/10/ 2019 at 9 a.m	Tori Municipality	Preparatory meeting with the Mayor of Tori	2 h	4	2 men 2 women
30/10/ 2019 at 1:30 p.m	District of Tangbo-Djevie in Ze	Preparatory field meeting with the local authorities (CA and CV) concerned in the Tangbo- Djevie District in Ze	2h	8	6 men 2 women
31/10/2019 at 3 p.m	District of Tori - Cada	Preparatory meeting on the ground with the local authorities (CA and CV) concerned in the District of Tori - Cada	2h	9	7 Men 2 Women
11/11/2019 at 4 p.m	District of Tori - Cada	Public consultation with the people living along the Tori - Cada District project site	3h	54	52 men 2 women
14/11/2019 at 10 a.m	Dokanme	Focus group with the village chief, his councillors and religious leaders	2h	16	14 men 02 women
15/11/2019 at 10 a.m	District of Tangbo-Djevie in Ze	Public consultation with the people living in the vicinity of Tangbo- Djevie project site.	3h		
19/11/2019 at 10 a.m	Dokanme	Focus group with Dokanme youth group	1h 30	36	34 men 02 women
19/11/2019 at 14 a.m	District of Tori - Cada	Focus group with the village chief, his councillors and the religious leaders of Zebe	2 h	11	09 men 02 women
20/11/2019 at 10 a.m	Zebe	Focus group with Zebe youth group	2 h	19	14 men 05 women
20/11/2019 At 3 p.m	Gbetaga	Focus group with the village chief, his	2h	15	13 men



Date	Locality	Institution or group met	Duration of the meeting	Number of Participants	Men/ Women
		councillors and the religious leaders of Gbetaga			02 women
21/11/2019 at 10 a.m	Dokanme	Focus group with the women of Dokanme	2h	34	01 man 33 women
21/11/2019 at 4 p.m	Zebe	Focus group with Sogbe women's group	2 h	15	11 men 04 women
22/11/2019 at 10 a.m	Zebe	Focus group with the vulnerable people of Zebe	1h	11	06 men 05 women
22/11/2019 At 2 p.m	Sogbe	Focus group with the village chief, his councillors and the religious leaders of Sogbe	2h	11	09 men 02 women
23/ 11/2019 at 3 p.m	Tori-Cada District	Focus group with the craftsmen and merchants of Tori-Cada District	1h30	15	10 femmes 05 hommes
25/11/2019 at 9 a.m	Tori-Cada District	Focus group with the Associations/CSOs of Tori-Cada District	1h30	21	16 men 05 women
25/11/2019 at 4 p.m	Tori-Cada District	Focus group with farmers, stockbreeders and landowners of the Tori-Cada District	2h	14	12 men 02 women
30/12/2019 at 9 a.m	District of Tangbo-Djevie in Ze	Public Consultation with the residents of Tangbo- Djevie in Ze	2h	39	34 men 05 women
31 /12/2019 at 9 a.m	District of Tangbo-Djevie in Ze	Focus group with Operators and Owners	2h	26	24 men 02 women
02/01/2020 at 2 p.m	District of Tangbo-Djevie in Ze	Focus group with Tangbo- Djevie Association/CSOs	1h30	15	13 men 02 women
02/01/2020 at 4 p.m	District of Tangbo-Djevie in Ze	Focus group with Craftsmen and traders of Tangbo- Djevie region	1h30	17	12 men 5 women
03/01/ 2020 At 9 a.m	HoueZe	Focus group village chief, councillors and religious leaders	2h	12	10 men 02 women
03/01/ 2020 At 3 p.m	HoueZe	Focus group with young people	1h30	19	17 hommes

Date	Locality	Institution or group met	Duration of the meeting	Number of Participants	Men/ Women
					02 femmes
04/01/2020 at 9 a.m	Djitin- Aga	Focus group with village chief, councillors and religious leaders	2h	15	13 men 2 women
04/01/2020 at 2 p.m	HoueZe	Focus group with vulnerable people	1h	11	08 men 03 women
06/01/2020 at 9 a.m	Anavie	Focus group with village chief, councillors and religious leaders	2h	18	13 men 05 women
06/01/2020 at 4 p.m	Djitin- Aga	Focus group with the women of Djitin- Aga	2h	22	21 women 01 man
07/01/2020 at 9 a.m	Anavie	Focus group with young people	1h30	18	16 men 02 women
14/01/2020	Cotonou	Meeting with the IGN	1h	3	-
15/01/2020	Cotonou	Meeting with the ANDF	1h	3	-
15/01/2020	Cotonou	Meeting with APIEX	1h	5	-
15/01/2020	Cotonou	Meeting with AGETIP Benin SE	1h	10	-

The visits to the Mayors took place in the premises of each of the municipalities concerned by appointment made in advance. These were courtesy visits to inform them about the team's presence on their respective territories, but also to present the project that will take place in their administration area and to collect their perceptions, suggestions, fears and expectations.

Topics covered during these visits include:

- presentation of the field team;
- statement of the purpose of the meeting;
- presentation of the industrial zone project and its objectives;
- presentation of the main achievements of the ESIA;
- presentation of the procedure for conducting focus groups and other field surveys;
- collection of the concerns, fears and expectations of the local authorities regarding the project, as well as their recommendations;
- collection of opinions and views on the project and the role that the mayor's office can play in the development of the project;
- collection of the Municipal Development Plan (PDC) of each of the two municipalities.

At the end of these interviews, the District Chiefs (CA) whose areas of jurisdiction include the project site were consulted together with the Village Chiefs (CV) located on the project site. This meeting was

organized in preparation for the organization of a public consultation meeting at the level of each district to inform the population about the project and the ongoing impact study.

Two site visits were also organized by Antea Group to show the local authorities, district chiefs and village chiefs of the Tori-Cada and Tangbo-Djevie districts, the location of some of the site boundaries.



**Figure 4: Site visits with local authorities**

A report of these various meetings was drawn up and signed at the end of each consultation with the local authorities. These minutes are presented as an annex to the ESIA report.

Following all these activities, a public consultation meeting was held at the headquarters of each of the two districts concerned in the two municipalities of Ze and Tori-Bossito with the authorities mentioned above. For these meetings, minutes were drawn up and signed in situ, attendance lists were signed and minutes were edited (they are placed as annexes to the ESIA report).



**Figure 5: Public consultation in Tangbo-Djevie District, November 15, 2019**



Figure 6: Public consultation in the District of Tori-Cada, November 11, 2019

Once the consultations had been carried out, the work of data collection and stakeholder consultation in each village was launched. The village chiefs whose village territory will be occupied by the future industrial zone were met, assisted by their counsellors (village notables) and religious leaders.

At each public consultation, the following topics were discussed:

- the presentation of the project, the ESIA and the process of consultations with the authorities and communities;
- negotiating the involvement of these leaders in the practical organization of field activities and focus groups;
- the administration of a specific data collection questionnaire focusing on the socio-economic aspects of the village: majority ethnic groups and first occupants of the village, number of households and people, main economic activities, use of community assets, basic socio-economic facilities (education, health, access to drinking water, electricity, sanitation, etc.), and social cohesion;
- discussion on the positive and negative impacts of the project, their concerns and expectations regarding this project and their feedback from other projects;
- the opinion on the project and the role that the village chief can play in its development.

Finally, focus-group discussions were organized and carried out in the 8 villages of the 2 districts concerned with, for each district:

- two groups of women;
- two groups of young people;
- two groups of vulnerable people;
- representatives of civil society organizations;
- representatives of artisanal traders;
- representatives of farmers, pastoralists and landowners.





Figure 7: Focus-group with young people from Dokanme (left) and Zebe (right)



Figure 8: Focus-group with the women of Dokanme

The summary of the topics discussed and conclusions of these meetings will be presented in an appendix to the ESIA report.

### 5.2.2. Summary of the concerns and wishes expressed by the populations

The various consultation activities with the project's local stakeholders revealed great fears about the project and strong opposition to it, which concretely materialized in the refusal of the populations to take part in consultation activities and, in some villages, focus-group activities. Whether at Ze or Tori-Cada, the majority of those consulted expressed their rejection of the project on the grounds that it would "snatch" their land again (thus referring to the airport project). Indeed, the land acquisition process for the airport seems to have been very badly experienced by the local residents who were deprived of their land and feel that they have not received compensation corresponding to the real value of their property.

Moreover, in the 2 municipalities visited, the populations expressed the wish that the authorities should take it upon themselves to send a delegation to present the project to them. They did not appreciate the fact that the information was transmitted by Antea Group without official representation of the project authorities.

The main fears expressed relate essentially to the expropriation that will be required to free up the land for the project and all the social consequences that this may have. Local residents fear that they will not be compensated at fair value, that they will not be able to find other sources of income and

that they will be exposed to hunger. They fear that expropriation will severely affect village social organization by leading to a loss of reference points, cultural values and norms, and a dislocation of the social order with an increase in delinquency and criminality. The effects of expropriation on family stability are also feared, with people dreading the dislocation of families as a result of men's inability to provide for their homes and the increase in female prostitution. The psychological effects of expropriation causing anxiety and concern could also have a negative impact.

Local residents are also afraid that they will not have jobs on the project site: they think it will be difficult for them, whether farmers or craftsmen to find work in an industrial zone or at the future airport because of their lack of qualifications. The women fear that they will not have opportunities to sell their goods at the project site. Finally, they fear the development of diseases due to the nuisances and pollution brought by the project.

Many proposals were made by the different groups interviewed in order to minimize some of the negative impacts of the project. Among these, the proposal to identify a site for the industrial zone within the future airport or to relocate the site to another zone initially planned for industrial development (in the commune of Ze).

In order to minimize the harmful effects of the expropriation, the populations asked that they be allowed to harvest their crops before the start of the works (in particular pineapple, which requires 2 years of growth) and not to destroy the crops before the actual start of the works. The populations draw a parallel with the management of the expropriation in the context of the airport project, during which the crops were destroyed even though works have not yet begun. The local residents are demanding real and fair compensation from the owners and operators before work begins. They want priority to be given to offering jobs on the project site to farmers who will be expropriated so that they can quickly regain a source of income, or to help them find other land to cultivate.

Requests are also made to give priority to offering jobs to young people from villages in the area who have diplomas and the skills required to work on the site, but also to women.

Recommendations were made on the respect of local standards by future workers on the site. Finally, many requests have been made for the project to strengthen local infrastructure: health, water, education, electricity, access roads, are all areas that the local residents would like to see improved thanks to the project.

More specifically, the expectations recorded are as follows:

- find a location to house the project within the site of the airport estate;
- allow the operators to harvest their current crop, especially pineapple, which has a two-year ripening period. Do not destroy the crops as in the case of the airport;
- the identification and relocation of the population to their home town of Tori in order to remain close to their cultural value;
- really start once the preconditions are met and avoid taking the land from the farmers and leaving it fallow without doing anything about it;
- real and fair compensation to owners and farmers before any work begins;
- the recruitment of all those who will lose their activities as a result of the project and the fair compensation of those affected;
- that the promoter arranges to find agricultural land for the men so that they can continue their agricultural activities;
- the recruitment of farmers affected by the project and all those in need of work in the villages;



- prioritize local labor and recruit first and foremost the village sons who have the diplomas and skills required for construction on site;
- the recruitment of female labor;
- take advantage of this opportunity to help vulnerable people, especially disabled people in the villages concerned by providing them with tricycles and finding subsidies for their health care;
- avoid courting local married women. This is one of the prohibitions of the local population;
- the construction of infrastructures in the villages near the project site: health center, school (college), water supply, markets, youth center, sports ground;
- electrification of the affected villages;
- the construction of village access roads and tracks;
- the construction of police stations in the villages.

### 5.2.3. Integration of stakeholders 'inputs into ESIA

In order to take into account, the expectations and fears of the populations living along the shoreline of the project, the following measures have been integrated into the ESIA and the ESMP:

- sensitizing workers to local customs;
- establishment of a local recruitment program that prioritizes PAPs, other villagers and women from villages of the study area;
- establishment of a Voluntary Community development plan by the promoter to finance the construction of infrastructures in villages bordering the project site.

In the RAP, a special consideration for the following measures will have to be made:

- provision of fair compensation corresponding to the real value of the assets especially for land;
- alignment of the project schedule and the work start-up period with the harvesting periods of the main crops on the site;
- establishment of a robust livelihood restoration program as part of the RAP.

## 5.3. Consultation process for the ESIA disclosure

Public consultations for the disclosure of the ESIA were organized from the 3<sup>rd</sup> to the 12<sup>th</sup> of November 2020. The purposes of these consultations were to present the main conclusions of the ESIA process, the major impacts of the Project and the proposed mitigation measures, and to get the feedback of project-affected communities on these measures. Various communication tools were used, mostly a poster and a PowerPoint. The Covid-19 prevention measures applicable in Benin were applied during the meetings.

Prior to the organization of consultation meetings in the villages of the study area, two meetings were organised at the level of the municipalities concerned by the Project:

- 03/11/2020: meeting with the Municipality of Tori-Bossito.
- 05/11/2020: meeting with the Municipality of Ze.

Following these, public meetings were organised in the 8 villages affected by the Project so that information was brought directly to the Project-Affected Persons with the aim of increasing public participation.

The meetings are presented in the table below. A total of 392 participants were enumerated, with 71% of men and 29% of women.

**Table 4 : ESIA disclosure consultations organised**

Date	Village	Duration of the meeting	Number of Participants	Men/ Women
04/11/2020	Houeze	2h10	53	30 Men 23 women
04/11/2020	Djitin-Aga	1h30	51	49 Men 2 Women
06/11/2020	Anavie	1h35	36	33 Men 3 Women
06/11/2020	Agbodjedo	1h25	52	28 Men 24 Women
10/11/2020	Sogbe	1h50	52	33 Men 19 Women
10/11/2020	Gbetaga	55 min	45	20 Men 25 Women
11/12/2020	Zebe	1h30	49	45 Men 4 Women
12/11/2020	Dokanme	1h15	57	41 Men 13 Women
TOTAL			392	279 Men (71%) 113 Women (29%)

A summary of these consultations, their transcripts and attendance lists are presented in annex to the ESIA main document.

## 6. Engagement Strategy

### 6.1. Methodology and tools

Different forms of dialogue may be required depending on the stakeholders, the subject to be addressed, the number of people to be involved, the history of the organization or group with the promoter, the objective sought (share / inform, consult / dialogue, negotiate, involve), etc.

Information must be provided to stakeholders in a format that is particularly convenient for them, in their language (Aizo, Fon and Adja), being careful not to use overly technical language or providing assistance in interpreting complex technical information.

Whenever possible, the Promoter prefers to engage in dialogue with stakeholders in a direct manner, through physical meetings, but dialogue can also be done through legitimate and credible representatives or using remote communication means. He also prefers oral communication rather than written ones since an important part of the local communities is poorly literate.

Stakeholder engagement can be done using one or more of the techniques listed in the table below.

**Table 5 : Techniques for communication and engagement**

REMOTE COMMUNICATION	DIRECT COMMUNICATION
GDIZ website, social media accounts and newsletter	Public announcements by village town criers
Press releases and articles in the media (radio, newspapers, TV)	Working meetings and thematic workshops with certain categories of stakeholders
Correspondence by mail, e-mail, telephone	Public information meetings
Official or formal letter	Focus groups with different professional or demographic groups
Posters, brochures, posters to be placed at strategic points (offices of the village chiefs, Municipality bulletin board and other frequently visited public places, etc.)	Individual interviews
	Field visits and official visits (inaugurations, ceremonies, etc.)

The table below shows the most appropriate techniques to use for each major category of stakeholders.

Table 6 : Methodology for consulting stakeholder groups

Stakeholder	Mode of communication / consultation
Governmental authorities at the national level	<ul style="list-style-type: none"> <li>GDIZ website, social media accounts and newsletter</li> <li>Correspondence by mail, e-mail, telephone</li> <li>Official or formal letter</li> <li>Individual interviews</li> <li>Working meetings and thematic workshops</li> </ul>
<ul style="list-style-type: none"> <li>Prefect of the Atlantic Department</li> <li>Mayors of the 2 municipalities</li> <li>Chiefs of the 2 districts</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ website, social media accounts and newsletter</li> <li>Correspondence by mail, e-mail, telephone</li> <li>Official or formal letter</li> <li>Individual interviews</li> <li>Working meetings and thematic workshops</li> <li>Field visits and official visits (inaugurations, ceremonies, etc.)</li> </ul>
Chiefs of the 8 villages and their councils (including religious leaders)	<ul style="list-style-type: none"> <li>Correspondence by mail, e-mail, telephone</li> <li>Official or formal letter</li> <li>Individual interviews</li> <li>Working meetings and thematic workshops</li> <li>Field visits and official visits (inaugurations, ceremonies, etc.)</li> </ul>
Property developers and buyers of land in the project area	<ul style="list-style-type: none"> <li>Official or formal letter</li> <li>Correspondence by mail, e-mail, telephone</li> <li>Individual interviews</li> <li>Working meetings and thematic workshops</li> </ul>
Populations of the 8 villages surrounding the project site (including Project-affected persons)	<ul style="list-style-type: none"> <li>Press releases and articles in the media (radio, newspapers)</li> <li>Public announcements by village town criers</li> <li>Posters, brochures, posters to be placed at strategic points (offices of the village chiefs, Municipality bulletin board and other frequently visited public places, etc.)</li> <li>Field visits and official visits (inaugurations, ceremonies, etc.)</li> <li>Public information meetings</li> <li>Working meetings and thematic workshops</li> <li>Discussion groups</li> </ul>
Civil Society Organizations (CSOs) representing the interests of the Project-Affected Persons	<ul style="list-style-type: none"> <li>GDIZ website, social media accounts and newsletter</li> <li>Correspondence by mail, e-mail, telephone</li> <li>Official or formal letter</li> <li>Individual interviews</li> <li>Working meetings and thematic workshops</li> </ul>

A report will be drafted at the end of each stakeholder meeting so that accurate and detailed information and views can be gathered (see § 0).

## 6.2. Special measures during Covid-19 epidemic

During the duration of the COVID-19 epidemic, it is not advisable to organize working meetings, thematic workshops, public consultation meetings or focus groups with more than 10 people. In order to limit the number of participants, it is advisable to call in representatives of the neighboring communities or organizations concerned and to inform these organizations of the reasons limiting the number of participants. If necessary, it is possible to hold several meeting sessions on the same theme to reach as many persons as possible.

As much as possible, meetings should be held outdoors or in a well-ventilated room with doors and windows open. If the meeting is held indoors, displays of barrier gestures must be clearly visible and a reminder of these gestures at the start of the meeting must be made.

At the entrance to the meeting place, hydroalcoholic gel or, failing that, water and soap should be made available to participants. A distance of one meter between the participants (i.e. two empty chairs between each participant) should be maintained and the wearing of a mask is recommended if masks are available locally.

Anyone exhibiting symptoms of COVID-19 during the meeting, particularly cough and fever feeling, will be asked to leave the meeting and return to their home. The meeting will then be suspended and postponed to a later date.

Preventive measures should be communicated before the meeting in order to reduce the risk of non-participation.

If a COVID-19 case is confirmed in one of the municipalities of the study area, no meeting will be organized for a period of 14 days. This period may be extended as long as new cases are detected by the local health authorities.

The promoter will be invited to consult with the local authorities (district chief and village chiefs) before the organization of any meeting in the villages, in order to ensure that there is no declared case of COVID-19 among the villagers and confirm with them that the meetings can be held in compliance with the sanitary rules in force in Benin and international recommendations.

## 6.3. Engagement plan

The engagement strategy proposed here is designed according to the stages of project implementation, distinguishing between the project preparation phase, which covers the completion of the ESIA and RAP, the construction phase and then the operation phase.

It is during the preparation phase that the commitment must be most intensive, since it is necessary to:

- obtain acceptance of the project by the communities bordering it;
- finalize the ESIA, disclose the ESIA to stakeholders and make available the final ESIA report to them;
- prepare the RAP, disclose it to stakeholders and make the final version available to them;
- deploy the project's environmental and social management system;
- put in place the various compensatory measures and support programs;
- recruit the companies in charge of the work and ensure that they comply with the requirements of the ESIA and the ESMP;

- deploy the monitoring and follow-up system for the ESMP.

During the construction phase, the level of commitment will also be high but above all concentrated on the management of the claim's mechanism from the communities and the supervision of the site to minimize the risks on the health and safety of workers and the nuisances or unplanned impacts on the communities.

In the operation phase, the level of commitment will be lower and will focus on recruiting the workforce and monitoring the plants set up on the site to ensure their compliance with the environmental and social standards set by the project in its General operating guidelines.

The table below outlines the engagement activities to be carried out for each of these phases and the stakeholders involved.



Table 7 : Engagement activities for each phase of the project

Objective	Engagement techniques	Stakeholder concerned	Responsibilities	Timeline
<b>1. PREPARATION PHASE</b>				
<b>OBJECTIVE: Obtaining broad community support for the project</b>				
Obtain broad community support for the project by the local communities	<ul style="list-style-type: none"> <li>Official visits</li> <li>Public information meetings</li> <li>Press releases and publication of information on the project and the commitments made to the communities.</li> <li>GDIZ website, social media accounts and newsletter</li> </ul>	<ul style="list-style-type: none"> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> <li>District chiefs of Tangbo-Djevie and Tori-Cada</li> <li>Heads of 8 affected villages</li> <li>Resident populations of these villages</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ (community relations service)</li> <li>Authorities supporting the project</li> </ul>	<ul style="list-style-type: none"> <li>Throughout the ESIA Report preparation</li> </ul>
<b>OBJECTIVE: Finalizing the ESIA to IFC standards including public disclosure</b>				
Disclose the ESIA draft report to the stakeholders for consultation	<ul style="list-style-type: none"> <li>Public announcements posted on the Municipality bulletin board and other frequently visited public places</li> <li>Radio or newspaper advertisements</li> <li>Communications to mayors and village chiefs, correspondence by mail / fax / email / or telephone</li> </ul>	<ul style="list-style-type: none"> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> <li>District chiefs of Tangbo-Djevie and Tori-Cada</li> <li>Heads of 8 affected villages</li> <li>Resident populations of these villages</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ (community relations service)</li> <li>Consulting company in charge of performing ESIA</li> </ul>	<ul style="list-style-type: none"> <li>At the end of the preparation of ESIA draft report</li> </ul>

Objective	Engagement techniques	Stakeholder concerned	Responsibilities	Timeline
	<ul style="list-style-type: none"> <li>Public information meetings</li> </ul>			
Publish the final ESIA report on GDIZ Website for 60 days	<ul style="list-style-type: none"> <li>GDIZ website</li> </ul>	<ul style="list-style-type: none"> <li>General public</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>At the end of the preparation of ESIA final report</li> </ul>
Make the final ESIA report available to the population in the municipalities of Ze and Tori-Bossito	<ul style="list-style-type: none"> <li>Communications to mayors and village chiefs, correspondence by mail / fax / email / or telephone</li> <li>Distribution of ESIA NTS to the municipalities</li> <li>Full ESIA available on GDIZ website</li> </ul>	<ul style="list-style-type: none"> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> <li>District chiefs of Tangbo-Djevie and Tori-Cada</li> <li>Heads of 8 affected villages</li> <li>Resident populations of these villages</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>At the end of the preparation of ESIA final report</li> </ul>
<b>OBJECTIVE: Preparing and finalizing the RAP study including public disclosure</b>				
Inform local stakeholders and project-affected persons (PAP) on the RAP study, census date and expected cut-off date	<ul style="list-style-type: none"> <li>Posters, brochures, to be placed at strategic points (offices of the village chiefs, Municipality bulletin board and other frequently visited public places, etc.)</li> <li>Radio or newspaper advertisements</li> <li>Communications to mayors and village chiefs, correspondence by mail / fax / email / or telephone</li> <li>Public announcements by village town criers</li> </ul>	<ul style="list-style-type: none"> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> <li>District chiefs of Tangbo-Djevie and Tori-Cada</li> <li>Heads of 8 affected villages</li> <li>Project-affected persons (PAP)</li> </ul>	<ul style="list-style-type: none"> <li>RAP Consultant</li> </ul>	<ul style="list-style-type: none"> <li>Before implementing the census of assets and identification of PAP</li> </ul>

Objective	Engagement techniques	Stakeholder concerned	Responsibilities	Timeline
	<ul style="list-style-type: none"> <li>Public information meetings</li> </ul>			
Disclose PAP census results and validate them with each PAP	<ul style="list-style-type: none"> <li>Public information meetings</li> </ul>	<ul style="list-style-type: none"> <li>Heads of 8 affected villages</li> <li>Project-affected persons (PAP)</li> </ul>	<ul style="list-style-type: none"> <li>RAP Consultant</li> </ul>	<ul style="list-style-type: none"> <li>After the census of assets and identification of PAP</li> </ul>
Consult PAP on the proposed RAP measures covering compensation rates and livelihood restoration measures	<ul style="list-style-type: none"> <li>Working meetings and thematic workshops with certain categories of stakeholders</li> <li>Focus groups with different socio-professional or socio-demographic groups</li> </ul>	<ul style="list-style-type: none"> <li>Heads of 8 affected villages</li> <li>Project-affected persons (PAP)</li> </ul>	<ul style="list-style-type: none"> <li>RAP Consultant</li> </ul>	<ul style="list-style-type: none"> <li>After the census of assets and identification of PAP</li> </ul>
Disclose RAP report in its draft version to PAP and local authorities	<ul style="list-style-type: none"> <li>Public information meetings</li> </ul>	<ul style="list-style-type: none"> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> <li>District chiefs of Tangbo-Djevie and Tori-Cada</li> <li>Heads of 8 affected villages</li> <li>Project-affected persons (PAP)</li> </ul>	<ul style="list-style-type: none"> <li>RAP Consultant</li> </ul>	<ul style="list-style-type: none"> <li>At the end of the preparation of RAP draft report</li> </ul>
Publish the final RAP report on GDIZ Website for 60 days	<ul style="list-style-type: none"> <li>GDIZ website</li> </ul>	<ul style="list-style-type: none"> <li>General public</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>At the end of the preparation of RAP final report</li> </ul>
<b>OBJECTIVE: Preparing the implementation of ESMP and its accompanying plans</b>				
Set up the project's <b>environmental and social management system</b> and determine the framework for relationship with ABE	<ul style="list-style-type: none"> <li>Working meetings</li> <li>Individual interviews</li> </ul>	<ul style="list-style-type: none"> <li>ABE</li> <li>Atlantic/Littoral Departmental Direction for the Living Environment and Sustainable Development (DDCVDD)</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>Before the start of construction</li> </ul>

Objective	Engagement techniques	Stakeholder concerned	Responsibilities	Timeline
		<ul style="list-style-type: none"> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> </ul>		
Set up local ESMP steering committees and identify and set up municipalities' focal points and villages facilitators (for SEP)	<ul style="list-style-type: none"> <li>Working meetings</li> <li>Individual interviews</li> </ul>	<ul style="list-style-type: none"> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> <li>District chiefs of Tangbo-Djevie and Tori-Cada</li> <li>Heads of 8 affected villages</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>Before the start of construction</li> </ul>
Inform on the <b>local grievance management mechanism</b> and its functioning	<ul style="list-style-type: none"> <li>Posters, brochures, to be placed at strategic points (offices of the village chiefs, Municipality bulletin board and other frequently visited public places, etc.)</li> <li>Communications to mayors and village chiefs, correspondence by mail / fax / email / or telephone</li> <li>Public information meetings</li> <li>Individual interviews</li> </ul>	<ul style="list-style-type: none"> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> <li>District chiefs of Tangbo-Djevie and Tori-Cada</li> <li>Heads of 8 affected villages</li> <li>Resident populations of these villages</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>One information campaign in each village before the start of construction</li> </ul>
Inform on the <b>local employment program</b> and its functioning with the second objective in mind, which is to <b>minimize project-induced in-migrations</b>	<ul style="list-style-type: none"> <li>Press releases and publication of information on the project</li> <li>Radio or newspaper advertisements</li> <li>Communications to mayors and village chiefs,</li> </ul>	<ul style="list-style-type: none"> <li>General public</li> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> <li>District chiefs of Tangbo-Djevie and Tori-Cada</li> <li>Heads of 8 affected villages</li> <li>Resident populations of these villages</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>One information campaign in each village before the start of construction</li> </ul>

Objective	Engagement techniques	Stakeholder concerned	Responsibilities	Timeline
	correspondence by mail / fax / email / or telephone <ul style="list-style-type: none"> <li>Public information meetings</li> </ul>			
Inform <b>women and vulnerable groups</b> about management measures that concern them (such as recruitment)	<ul style="list-style-type: none"> <li>Individual interviews</li> <li>Discussion groups</li> </ul>	<ul style="list-style-type: none"> <li>Women and vulnerable groups associations</li> <li>Social promotion centres of Tori-Bossito and Ze</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>Before the start of construction</li> </ul>
<b>Community health and safety</b> – identify local partners for awareness-raising program on health, hygiene, road safety	<ul style="list-style-type: none"> <li>Thematic working meetings and workshops</li> <li>Individual interviews</li> <li>Field visits</li> </ul>	<ul style="list-style-type: none"> <li>Atlantic/Littoral Departmental Health Department</li> <li>District health centers</li> <li>Competent NGOs for awareness-raising</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>Before the start of construction</li> </ul>
<b>Cultural heritage management</b> and protection of Anavie forest – validate protection measures	<ul style="list-style-type: none"> <li>Thematic working meetings and workshops</li> <li>Individual interviews</li> <li>Field visits</li> </ul>	<ul style="list-style-type: none"> <li>Village, traditional and religious leaders of Anavie village and other concerned villages (Agbodjedo, Houeze and Djitin-Aga)</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>Before the start of construction</li> </ul>
<b>Social influx management</b> – set up monitoring of influx by local authorities	<ul style="list-style-type: none"> <li>Thematic working meetings and workshops</li> <li>Individual interviews</li> <li>Field visits</li> </ul>	<ul style="list-style-type: none"> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> <li>District chiefs of Tangbo-Djevie and Tori-Cada</li> <li>Heads of 8 affected villages</li> <li>District health centers</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>Before the start of construction</li> </ul>
<b>Community development plan</b> – conduct dedicated study in partnership with local authorities	<ul style="list-style-type: none"> <li>Thematic working meetings and workshops</li> <li>Individual interviews</li> <li>Field visits</li> </ul>	<ul style="list-style-type: none"> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> <li>District chiefs of Tangbo-Djevie and Tori-Cada</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>Before the start of construction</li> </ul>

Objective	Engagement techniques	Stakeholder concerned	Responsibilities	Timeline
		<ul style="list-style-type: none"> <li>Heads of 8 affected villages</li> </ul>		
<b>2. CONSTRUCTION PHASE</b>				
Inform on the <b>start of the work</b>	<ul style="list-style-type: none"> <li>Press releases and publication of information on the project</li> <li>Radio or newspaper advertisements</li> <li>Public announcements by village town criers</li> <li>Communications to mayors and village chiefs, correspondence by mail / fax / email / or telephone</li> </ul>	<ul style="list-style-type: none"> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> <li>District chiefs of Tangbo-Djevie and Tori-Cada</li> <li>Heads of 8 affected villages</li> <li>Resident populations of these villages</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>2 weeks before the actual start</li> </ul>
Inform regularly on the <b>progress of the work</b>	<ul style="list-style-type: none"> <li>GDIZ website, social media accounts and newsletter</li> <li>Press releases and publication of information on the project</li> <li>Radio or newspaper advertisements</li> <li>Communications to mayors and village chiefs, correspondence by mail / fax / email / or telephone</li> </ul>	<ul style="list-style-type: none"> <li>Prefecture of the Atlantic Department</li> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> <li>District chiefs of Tangbo-Djevie and Tori-Cada</li> <li>Heads of 8 affected villages</li> <li>Resident populations of these villages</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>Every 2 months</li> </ul>
Consult vulnerable groups (women, PWDs) to	<ul style="list-style-type: none"> <li>Individual interviews</li> <li>Discussion groups</li> </ul>	<ul style="list-style-type: none"> <li>Women and vulnerable groups associations</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>Every 2 months</li> </ul>



Objective	Engagement techniques	Stakeholder concerned	Responsibilities	Timeline
monitor any unplanned impact on them		<ul style="list-style-type: none"> <li>Social promotion centres of Tori-Bossito and Ze</li> </ul>		
Implement measures relating to <b>community health and safety</b> – deploy awareness-raising program on health, hygiene, road safety	<ul style="list-style-type: none"> <li>Thematic working meetings and workshops</li> <li>Individual interviews</li> <li>Field visits</li> </ul>	<ul style="list-style-type: none"> <li>Atlantic/Littoral Departmental Health Department</li> <li>District health centers</li> <li>Competent NGOs for awareness-raising</li> <li>Heads of 8 affected villages</li> <li>Resident populations of these villages</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>2 sessions per months in a different village</li> </ul>
Implement measures relating to <b>social influx management</b> – meet local authorities and district health centres to monitor social influx trends	<ul style="list-style-type: none"> <li>Thematic working meetings and workshops</li> <li>Individual interviews</li> <li>Field visits</li> </ul>	<ul style="list-style-type: none"> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> <li>District chiefs of Tangbo-Djevie and Tori-Cada</li> <li>Heads of 8 affected villages</li> <li>District health centers Tori-Cada and Tangbo-Djevie</li> <li>Centres for social promotion Tori-Bossito and Ze</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>Every 3 months</li> </ul>
Report on the implementation of the <b>Construction ESMP</b> to local authorities through a meeting with <b>ESMP monitoring committee</b>	<ul style="list-style-type: none"> <li>Working meetings</li> </ul>	<ul style="list-style-type: none"> <li>ESMP monitoring committee of Tori-Bossito and Ze</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>Every 3 months</li> </ul>
Report on the implementation of the <b>Construction ESMP</b> to environmental authorities	<ul style="list-style-type: none"> <li>Working meetings</li> <li>Individual interviews</li> <li>Field visits</li> </ul>	<ul style="list-style-type: none"> <li>ABE</li> <li>Atlantic/Littoral Departmental Direction for the Living Environment and Sustainable Development (DDCVDD)</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>Every 3 months</li> </ul>

Objective	Engagement techniques	Stakeholder concerned	Responsibilities	Timeline
		<ul style="list-style-type: none"> <li>Prefecture of the Atlantic Department</li> <li>Ze and Tori Municipalities</li> <li>Heads of affected villages</li> </ul>		
<b>3. OPERATION PHASE</b>				
Inform on <b>recruitment procedures</b>	<ul style="list-style-type: none"> <li>Press releases and publication of information on the project</li> <li>Radio or newspaper advertisements</li> <li>Communications to mayors and village chiefs, correspondence by mail / fax / email / or telephone</li> <li>Public information meetings</li> </ul>	<ul style="list-style-type: none"> <li>Prefecture of the Atlantic Department</li> <li>Mayors of the municipalities of Ze and Tori-Bossito</li> <li>District chiefs of Tangbo-Djevie and Tori-Cada</li> <li>Heads of affected villages</li> <li>Resident populations of these villages</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>Before the start of operation</li> </ul>
Implement measures relating to <b>community health and safety</b> – deploy awareness-raising program on road safety	<ul style="list-style-type: none"> <li>Thematic working meetings and workshops</li> <li>Individual interviews</li> <li>Field visits</li> </ul>	<ul style="list-style-type: none"> <li>Atlantic/Littoral Departmental Health Department</li> <li>District health centers</li> <li>Competent NGOs for awareness-raising</li> <li>Heads of 8 affected villages</li> <li>Resident populations of these villages</li> </ul>	<ul style="list-style-type: none"> <li>GDIZ</li> </ul>	<ul style="list-style-type: none"> <li>One village per month</li> </ul>
Report on the implementation of the <b>Operation ESMP</b>	<ul style="list-style-type: none"> <li>Working meetings</li> <li>Individual interviews</li> <li>Field visits</li> </ul>	<ul style="list-style-type: none"> <li>ABE</li> <li>Atlantic/Littoral Departmental Direction for the Living Environment and Sustainable Development (DDCVDD)</li> </ul>	<ul style="list-style-type: none"> <li>ABE</li> <li>Atlantic/Littoral Departmental Direction for the Living</li> </ul>	<ul style="list-style-type: none"> <li>Once a year at least</li> </ul>

Objective	Engagement techniques	Stakeholder concerned	Responsibilities	Timeline
		<ul style="list-style-type: none"> <li>▪ Prefecture of the Atlantic Department</li> <li>▪ Ze and Tori Municipalities</li> </ul>	Environment and Sustainable Development (DDCVDD)	

## 7. Claim management mechanism

An important element of successful stakeholder engagement is the establishment of a system to capture and respond to claims from all stakeholders throughout the life of the project. Such mechanisms should be put in place so that all relevant stakeholders can be assured that their claims are recognized and dealt with in a consistent and transparent manner.

The claim resolution mechanism is an essential means of responding to the concerns expressed by stakeholders regarding project impacts and their mitigation. Stakeholders will be able to submit a claim even if they have only a suspicion that an adverse effect may be caused by the project.

It will be the responsibility of the CRS service to validate and defend whether the alleged negative impact is due to the project activities. The CRS service will assess each claim on a case-by-case basis. This will result in either a corrective action or an argument for rejecting the claim.

This section explains the methodology for submitting, receiving and registering claims from project-affected communities and the best approach for responding to and investigating these claims.

### 7.1. Definition and scope of the mechanism

A claim is a concern raised by an individual or group affected by project activities. Both concerns and claims can result from real or perceived impacts of the activities and both can be raised in the same manner and dealt with under the same procedure.

The claim procedure is intended to collect and address the following categories of claims:

- **land acquisition:** temporary or permanent problems related to land use;  
*Examples: disagreements over land value and the valuation process, claims about problems in identifying landowners; and*
- **environment, health and safety:** all matters related to the impact of project activities on the environment, health and safety of potentially affected communities;  
*Example: claims related to noise and pollution.*
- **employment:** dissatisfaction with the recruitment procedure;  
*Example: grievances of discrimination in the selection of workers*
- **logistics and transport:** claims related to operational vehicles and freight transport;  
*Examples: exceeding speed limits, dust generated by vehicles, road accidents, etc.*
- **social behavior in the community:** claims about the behavior of GDIZ employees and subcontractors;  
*Example: lack of respect for members of a community, incentive to prostitution, etc.*

Thus, the procedure excludes certain types of claims, which must be addressed to other services or structures, as shown in the table below.

Table 8 : Claims outside the scope of the mechanism

Out-of-scope claims	Department or structure concerned
Commercial claims from partners, suppliers of goods and services	Entities in charge of relations with third parties
Applications relating to social funds or local development projects	Environmental and Social department (ESD)
Claims appealed to a judicial body	Legal Department from GDIZ

## 7.2. Principles and good practices

The following principles are applied to the handling of claims:

- **legitimate:** the procedure is designed and implemented in such a way as to be perceived as legitimate and to increase the confidence of local communities, in particular through regular verification of the communities' perception of the procedure and regular reporting on its operation;
- **fair, predictable and accessible:** the procedure is well known and understood by local communities;
- **transparent and based on participation and dialogue:** the complainant is regularly informed of the status of the processing of his or her claim, which is dealt with within an acceptable time limit;
- **compatible with local laws** and regulations and internationally recognized human rights;
- **a source of continuous learning:** the origin of claims is analyzed in order to draw criteria for improvement and prevention of the operational procedures that generated them.

The procedure also ensures the protection of complainants, in particular by guaranteeing the complainant's right to confidentiality and anonymity and protection against reprisals. This right to anonymity is exercised as follows:

- **Systematic acceptance of the filing of a claim** by a complainant even if the latter does not want his identity to be revealed (filing of an anonymous claim). This can happen during an environmental pollution that a person wishes to report without risking threats to his/her safety.
- **Undertaking not to disclose the identity of the complainant** to stakeholders internal to the company outside the GDIZ Environmental and Social Department and to stakeholders external to the company (authorities, subcontractors, police, etc.) without the express consent of the complainant.

## 7.3. Objectives

The objectives of a claim management mechanism are to:

- give stakeholders the **opportunity to raise their concerns** and claims by providing them with a clear and simple procedure, which offers an assurance of support and rapid response from the promoter.
- manage the handling of stakeholder claims in a **structured and systematic way** and allow monitoring of the effectiveness of the mechanism and improvement of impact management;

- **improve relations with stakeholders** by being responsive and respectful and by dealing with their claims in a fair and transparent manner, in line with international best practice.

## **7.4. General procedure for the management of community claims**

### **7.4.1. Detailed functioning**

The procedure to be put in place for the management of claims is presented in the following table.

The time targets for resolving a claim are:

- 14 days for unfounded claims of low to moderate importance;
- 24 days for high and major importance claims.

If additional time is required to complete the investigation, the claim officer will inform the complainant of the reasons for the delay and the schedule will be revised.

If a claim enters Step 8 or 9 of the process, the timelines can no longer be guaranteed due to the involvement of company management and third parties in mediation.



Table 9 : Claim management procedure

Step	Deadline	Detail of the step
<b>Step 1:</b> Claim submission	-	<p>A claim may be submitted orally or in writing:</p> <ul style="list-style-type: none"> <li>▪ At regular meetings between stakeholders and GDIZ</li> <li>▪ During the field visits conducted by the CRS team</li> <li>▪ Through communications by letter, fax, telephone or e-mail</li> <li>▪ To the head of the village where the claimant lives</li> </ul> <p>For this purpose, the contact details of the CRS team and the 2 claim officers will be provided to the local authorities and will also be displayed in public, easily accessible and visible places.</p> <p>A claim form will also be made available to affected populations.</p>
<b>Step 2:</b> Claim registration and acknowledgement of receipt	5 days after the date of submission	<p>For concerns and claims that have been submitted orally, the CRS team will arrange a meeting at which the concern or claim can be explained in detail and recorded on a claim log form.</p> <p>For written claims, the documents sent by the complainant will be scanned and archived on the CRS team's server.</p> <p>The registration of the claim will then be recorded in the claims register set up by GDIZ.</p> <p>The intervener who lodged the claim will then be contacted within 5 days to confirm that GDIZ has received the claim.</p>
<b>Step 3:</b> Study of the admissibility and categorization of the claim	3 days after step 2	<p>The CRS team first of all examines whether the claim is legitimate and admissible, i.e. whether it can actually be traced back to a project failure.</p> <p>It then categorises the claim according to its main cause: health, safety, resettlement and compensation, environment, cultural heritage, nuisance, etc.</p> <p>It then determines the severity of the claim according to 4 levels: low, moderate, high and major depending on the claim:</p>

Step	Deadline	Detail of the step
		<ul style="list-style-type: none"> <li>Is caused by a threat to human health and safety, a destruction of private assets or the degradation of the environment</li> <li>Requires more or less costly corrective action and potential payment of compensation.</li> <li>Could rapidly lead to judiciary issues</li> </ul>
<b>Step 4:</b> Simple response for inadmissible or low to moderate importance claims	3 days after step 3	<ul style="list-style-type: none"> <li>Claims that are not receivable are answered by letter delivered by hand to the complainant, explaining the reasons for rejecting their claim.</li> <li>Claims that are of minor or moderate importance are answered through a physical meeting with the claimant where the claim officer proposes a direct solution to the claim or present excuses for it.</li> </ul>
<b>Step 5:</b> Investigation of high to major claims	5 days after step 3	<p>Claims of high and major severity are the subject of a report to the management of GDIZ, which then mandates the carrying out of an investigation. This investigation can be carried out jointly with the competent State services and in particular the departmental services of:</p> <ul style="list-style-type: none"> <li>Departmental Direction of the Living Environment and Sustainable Development (DDCVDD) of the Atlantic / Coast</li> <li>Departmental Department of Agriculture, Livestock and Fisheries of the Atlantic</li> <li>Forest inspection</li> <li>Republican Police</li> <li>Health Department of Atlantic / Coastal Department</li> </ul> <p>The results of the investigation and all evidence are recorded and archived for future needs.</p>
<b>Step 6:</b> Proposal of a solution to the complainant	5 days after step 4 or 5	<p>In view of the results of the investigation, GDIZ offers a solution to the complainant, which can be based on a correction made to the breach found, compensation in kind or monetary.</p> <p>The claim officer meets with the complainant to propose the solution and obtain their agreement.</p>
<b>Step 7:</b> Resolution and closure of the claim	3 days after step 6	<p>The solution is implemented under the control of the CRS team, which then asks the complainant to sign a claim closure form.</p>

Step	Deadline	Detail of the step
<b>Step 8:</b> Mediation if the complainant refuses the proposed solution		If the complainant is not satisfied with the proposed solution, he may file a new written claim with the management of GDIZ and will be invited to participate in a mediation meeting with the Local mediation committee, where the complainant may be accompanied by the person who advises him (for example a traditional chef or a lawyer).
<b>Step 9:</b> Legal remedy for the complainant		If the complainant is not yet satisfied with the management's response, the complainant will be invited to submit his claim to the competent authorities and provide them with the necessary contact details.

### 7.4.2. Functioning scheme

The diagram below shows the flow of the claim management mechanism.

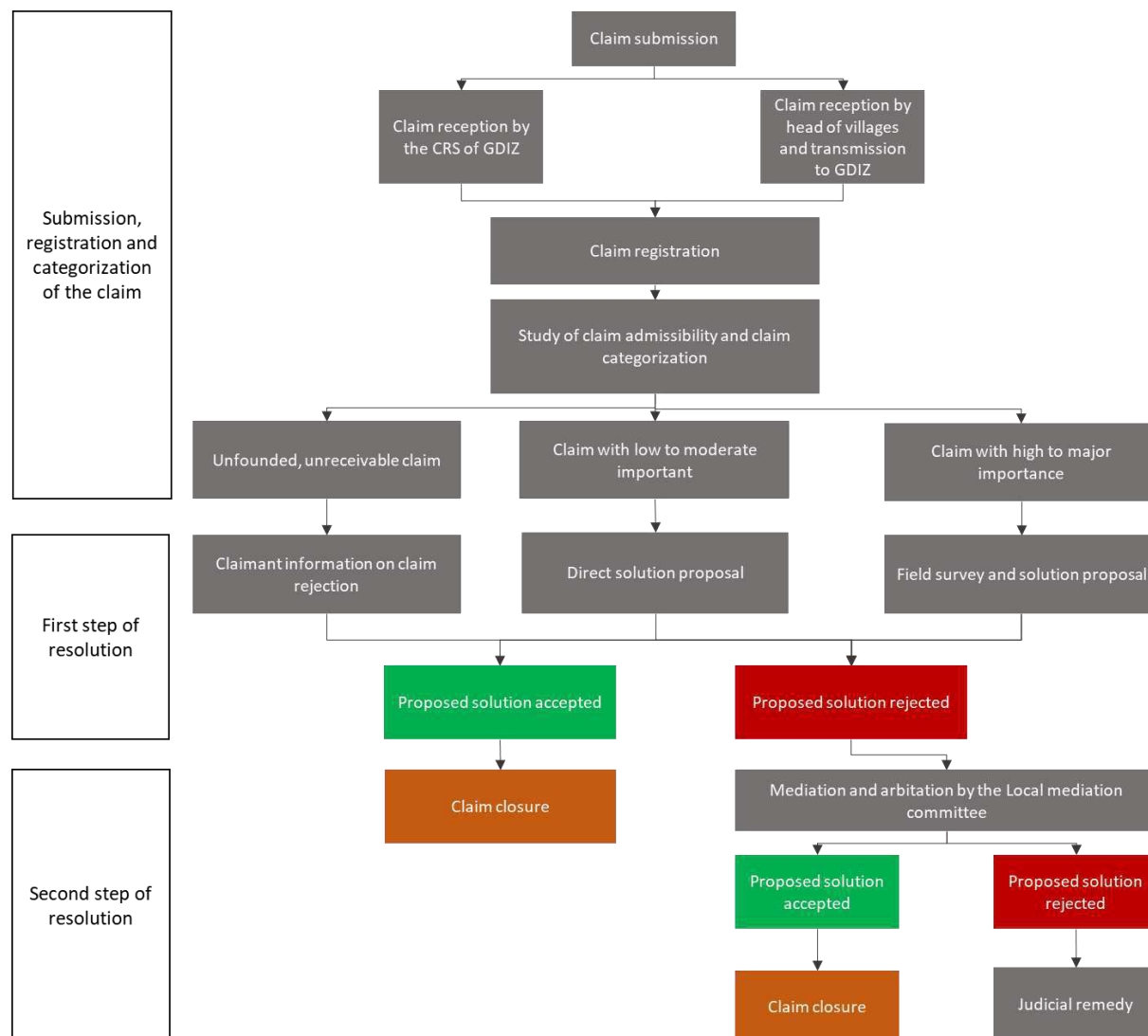


Figure 9 : Claim management mechanism

## 7.5. Specific procedures

### 7.5.1. Management of workers' grievances

Some claims, although they do not go through the general claim management procedure, must however be linked to it. This is the case for:

- Claims from GDIZ employees relating to their contract or working conditions.
- Claims from employees of suppliers, subcontractors and service providers relating also to their contract or working conditions.

Indeed, the working conditions of GDIZ employees and its contractors are major concerns according to international standards. These working conditions can therefore be the subject of internal or external audits of the company (internal audit carried out by the Environmental and Social Department, external audit carried out by the Beninese Labor Inspectorate or by environmental experts mandated by the lenders if the project is funded by them).

In this context, it is necessary that the human resources services provide a mechanism for receiving worker claims, offering different submission channels (telephone number, e-mail address, union channel, HSE committees) and guaranteeing the possibility of anonymous filing of claims. Workers' claims as well as all related documentation must then be recorded in a dedicated database by HR services.

The resolution of claims is the direct responsibility of the HR services, but the solution provided must be transcribed into the database.

Once this mechanism is operational, the ESD must collect this database from the HR services at regular intervals. This implies that the ESD sets up a functional collaboration relationship with GDIZ human resources very early in the project, in which HR undertakes to provide this list and to allow the ESD to conduct verifications or feedback on some claims.

In addition, the ESD must offer the employees of GDIZ subcontractors the opportunity to address any claims relating to working conditions to it, provided that the employees have already submitted their claims to their direct employer and that they have not been satisfied with the response provided by it. In this context, subcontracting companies and their employees must be informed of this possibility in writing (by posting for example) and orally (during start-up HSE meetings or safety quarter-hours, for example) with a contractual commitment on their part to respect GDIZ claim mechanism.

### 7.5.2. Management of collective grievances

The claim management mechanism takes into account claims from specific groups within communities (women, youth, vulnerable groups, minorities or elders) in the same way as those made by individuals from said communities. The claims are then issued collectively by these groups who appoint a representative to bring the claim to GDIZ.

### 7.5.3. Management of claims for gender-based violence

Finally, the procedure must also provide a clear framework for handling claims due to violence against women (or gender-based violence - GBV) or children.

In this very specific case, the CRS must:

- Determine what is the Beninese regulatory framework for dealing with violence against women or children in order to ensure that the procedure complies with it.
- Guarantee confidentiality at all stages of the procedure.
- Inform women and children of communities affected by the project, GDIZ staff and subcontractors of the existence of such a procedure with precision on the fact that it takes into account all forms of violence regardless of their severity (sexual harassment, touching, rape, etc.).

For the adequate management of claims for GBV, the steps and prerequisites are presented in the table below. They are issued from a recent publication from the European Bank for Reconstruction and Development (2020), *Addressing Gender-Based Violence and Harassment – Emerging Good Practice for the Private Sector*.

**Table 10 : Steps and prerequisites for the adequate management of claims for gender-based violence**

Step	Prerequisites
Submission	Set up channels for the submission of claims specifically dedicated to GBV and violence against children, for example in the form of a telephone number / hotline or through women's associations.
Recording and assessment of severity	Designate one or more persons from the SRC team in charge of receiving and registering this type of claim, who should be trained in collecting GBV cases. Ideally, at least one person should be female.
Investigation	<p>Designate one or more people internally at GDIZ in charge of investigating the claim. This person should be trained in investigative techniques adapted to GBV situations.</p> <p>Plan to use external investigative services for the management of GBV cases involving GDIZ management staff, community members or children. Indeed, the involvement of a third party in the investigation will legitimize the process. The SRC may call on the police or child protection services, or even NGOs working on these themes.</p> <p>Inform the suspected person of the facts to give him the opportunity to defend himself.</p>
Solution	<p>Designate the GDIZ entities (HR department, legal department, etc.) who will be responsible for defining the appropriate response.</p> <p>Discuss with the complainant the need to submit the claim to the police authorities and determine with him the modalities for submitting this claim by identifying the police service concerned.</p> <p>Identify and provide information on support services for victims to which they can turn (health, psychological support, legal services) and which can be provided by the country's administration or by a network of associations.</p>



## 7.6. Roles and responsibilities

Claims management will be the responsibility of the Community Relations Service (CRS) whose more precise role and composition are presented in § 8.1.1.

### 7.6.1. Claim officers

Within this team, one or more claims management officers will need to be recruited based on the expected flow of claims that is expected to occur depending on the geographic scope of the project.

For the present project, given the number of villages involved (8) and the surface of the project (1'462 ha), a significant flow of claims can be expected and a minimum of 2 agents is recommended.

**Claims management officers**, who will be the point of contact between GDIZ and the stakeholders, will be responsible for:

- respecting and applying the environmental and social standards of GDIZ;
- disseminating information on the existence and functioning of the claim management mechanism to the populations living in the project area and to the local authorities through regular information sessions, meetings with local authorities, poster displays, and any other culturally appropriate means;
- receiving claims and ensuring that they are properly recorded and documented in the claims register;
- coordinating field investigations and responding to claims;
- maintaining clear communications and keeping the complainant informed in accordance with the timeframes set out in this SEP;
- monitoring the performance of the SEP in terms of effectiveness and efficiency and reporting regularly to the CRS team leader and GDIZ management.

### 7.6.2. Local mediation committee

A **local mediation committee** will also be created to manage claims of high to major severity and whose solutions have been rejected by the complainant. This local committee will be composed of:

- The chief of the village of residence of the complainant.
- A customary representative appointed by the village chief.

And depending on the type of claim, the local committee may also welcome a representative of women, vulnerable groups or any other group particularly concerned by the claim.

If necessary, the higher authorities (head of the districts, mayors or prefect of the Atlantic Department) may be invited to take part in the mediation committee in order to provide their expertise in the management of community conflicts.

### 7.6.3. Role and responsibilities of contractors

The CRS will also need to ensure that project subcontractors, in particular the main contractor who will be responsible for the construction of the site, are aware of the claim management mechanism and its functioning. The main contractor is indeed an essential link in the claim mechanism, because

construction works frequently raise claims from local communities due to the nuisances they cause. The main contractor must therefore know how to receive claims and transfer them to GDIZ claim officers. He must prior to start of the work designate a person to be the manager of these claims on the construction site. He must also be ready to provide solutions (including financial compensations) when these claims are clearly caused by the works.

The contractor claim manager will be responsible of all the above tasks and will be the contact point of GDIZ for all claim-related matters. He will be in charge of registering the claims raised by the works in a database and provide monthly updates on the claim resolution progress, to be included in the Contractor monthly monitoring report.

## 7.7. Monitoring and evaluation

The CRS will need to set up a system for recording all claims received. This system will be based on:

- The development of a register of claims, in tabular form, which will make it possible to record each claim and all the necessary information on it, as well as the solutions provided. This register will allow statistical analysis to be carried out for monitoring purposes.
- The setting up a computer server on which the constituent elements of each claim file will be stored: letter from the complainant, photos of the element that led to the claim, investigation file, solutions proposed to the complainant, mediations undertaken, etc.

In order to monitor the effectiveness of the claim management mechanism, key monitoring indicators will be used such as:

- the number of claims received, closed or in the process of resolution;
- the average number of claims filed by complainant;
- the number of claims by degree of importance;
- the number of claims by category (health, safety, environment, resettlement, etc.);
- the average resolution time for a claim.

Monthly claims management reports (also covering engagement activities, see § 8.3) will be produced by the CRS team for GDIZ management.

As part of reporting results in the environmental monitoring report to be prepared for ABE, analyzing trends and the time required to resolve claims will help assess the effectiveness of the claim resolution mechanism.

Claims with high severity may be the subject of feedback sessions (REX) internal to the CRS team or even with the entities concerned by the claim (construction companies, legal service, etc.). These reviews will identify what worked or malfunctioned in the claim management procedure and put in place corrective measures to this procedure.

## 8. Implementation of the Stakeholder Engagement Plan

This section details the resources and responsibilities of the CRS (Community Relations Service) within GDIZ for the effective implementation of the SEP, as well as the methods and frequencies of reporting and monitoring.

### 8.1. Resources, roles and responsibilities

The overall responsibility for stakeholder consultation and participation will lie with GDIZ, which will form a Community Relations Service (CRS). This service will be integrated into the Environmental and Social Department (ESD) and will have to collaborate directly with the communication manager to prepare messages and communication supports so that they are in line with the more global corporate communication plan developed for GDIZ.

#### 8.1.1. Community relation service

The CRS team will be composed of:

- a team leader;
- two community relations officers;
- two claims officers.

The team will bring together professionals in the field of social sciences and communication who will have good knowledge of the project, as well as an understanding of global communication (internal and external) and mastery of communication techniques and tools.

The diagram below shows the expected organization chart.

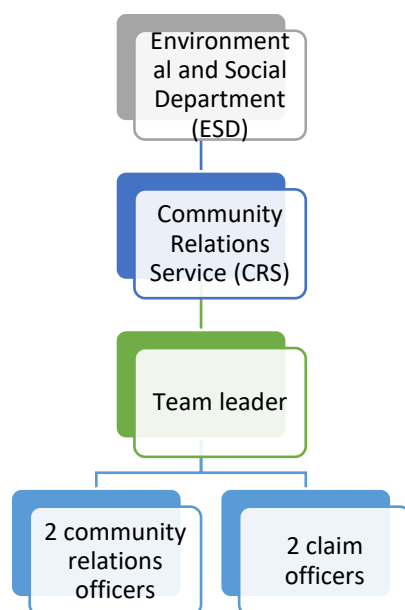


Figure 10 : CRS Department structure

The community relations team has the following **functions**:

- report on the implementation of the ESMP for its consultation component (SEP) to the ESD;
- complete the information on the stakeholders already capitalized in the framework of the ESIA and the present SEP: directory, etc.;
- supervise the communication with stakeholders at the local level;
- manage the claims management mechanism.

The following points describe the main responsibilities and tasks accomplished by the SRC team members.

The **team leader** will be responsible for:

- manage the team on a daily basis;
- develop management and monitoring tools such as the claims register, commitment register, stakeholder directory, standard forms, etc.;
- develop the team's annual commitment schedule detailing the types of activities to be carried out, the targets to be reached, the topics to be discussed, in collaboration with the Corporate Communication Department;
- facilitate the most strategic engagement activities;
- deploy and pilot the claims management mechanism in the villages and communes in the study area;
- implement and manage all tasks related to the stakeholder participation process;
- establish a plan for monitoring and evaluation of engagement and claims management;
- monitor the SEP to monitor the progress of its implementation and evaluate the effectiveness of the measures taken to ensure its objectives, including that all stakeholders are identified at each stage, that their concerns are adequately addressed in a timely manner, and that levels of interest and buy-in are acceptable;
- provide reports to GDIZ management for subsequent submission to other stakeholders such as Beninese Environmental Agency;
- be informed of major changes in project activities so that disclosure and consultation can be managed prior to progressing through the project phases, i.e. pre-construction, construction, commissioning, operation, maintenance, emergency response, operations safety management, etc.

The **community relations officers** will be responsible for:

- liaising between GDIZ and stakeholders;
- organizing in situ the engagement activities planned in the annual planning, write the minutes and the reports;
- identifying new stakeholders and updating the directory;
- recording engagement activities in the register;
- coordinating GDIZ response to all stakeholder engagement issues;
- managing community issues that may emerge and escalate these issues to the team leader for action.

### 8.1.2. Local intermediaries

In order to have **local intermediaries** in each of the villages in the study area, which will allow information to be easily disseminated without having to pay visits to the villages too often, the community relations management team will mobilize in each village a person who will act as the **project facilitator**. This person will be responsible for:

- disseminating specific information about the project;
- supporting the organization of meetings with village authorities, meetings and community consultations;
- forwarding claims so that they can be investigated by the community relations team;
- participating in the awareness-raising actions.

The latter must:

- reside in the village;
- speak and write French;
- speak the local language or languages;
- be morally blameless in the eyes of the population;

A total of 8 facilitators will be mobilized and will have to be remunerated.

In the continuity of the communication system, it is also recommended to have a focal point in the municipalities of Tori-Bossito and Ze (one in each municipality), responsible for:

- communication between the project and the municipal or regional services;
- mobilize the competent municipal services;
- organize meetings, consultations or awareness sessions at the municipal level;
- forward any claims from residents to the community relations team for treatment.

### 8.1.3. Material means

The CRS team will need to be provided with vehicles to be easily mobilized and to conduct the field activities required for claims management and dialogue with stakeholders. It will also need to have offices, computers and other equipment (office equipment, camera, GPS, etc.).

### 8.1.4. Annual budget

It is estimated that one year's mobilization of this team represents a budget of 52,800,000 FCFA (€80,493), along with an annual allowance of 24,000,000 FCFA for team expenses. This budget does not include any monetary compensation that may be disbursed to resolve certain claims.

## 8.2. Documentary structure and monitoring tools

In order to optimize the implementation of communication plans and engagement activities with stakeholders, the Community relations service will need to have a documentary structure and monitoring tools allowing, if necessary, to present to interested persons (E&S Director of GDIZ, donors wishing to finance the project) an inventory of communication and engagement actions carried out at an instant T.

The documentary structure will be built around a database which will enable to reference and then to save all the documents produced by the service, namely:

- communication documents designed for the project (press releases, posters, brochures, etc.);
- the reports and if necessary, the minutes of the various public consultation sessions, individual interviews or awareness-raising activities carried out with national, regional and local stakeholders and the populations affected by the project.

The Community relations service must also make available to ESD team members:

- A **directory containing all stakeholder contacts**, specifying the name of the structure, the contact person, e-mail and telephone numbers. This directory should be updated regularly to include any new stakeholders.
- An **agenda** presenting the various meetings and interviews planned for the coming year.
- **Consultation register** recording all the meetings and interviews already carried out associated with their minutes. Indeed, CRS team will have to **record all engagement activities** carried out in a **register of engagement activities/consultations**: date, meeting place, format of the activity (meeting, individual interview) and the purpose of the activity. Reports should be systematically made for each activity. For strategic activities (consultation and mediation meetings), minutes signed by all parties must be prepared, scanned and saved on a dedicated server and then shared with the participants.

## 8.3. Monitoring and evaluation

This SEP is a document that must be evaluated and updated periodically by the Community Relations Service team after validation by GDIZ. The following indicators will be used for monitoring and evaluation:

- number of press releases;
- number of thematic working meetings and workshops;
- number of public information meetings;
- number of discussion groups;
- number of individual interviews;
- number of official visits;
- number of participants in the various engagement events, distinguishing between men and women.



In order to qualitatively assess the engagement process, satisfaction surveys may be conducted regularly with local stakeholders. These surveys will help determine whether the project is facing consultation fatigue<sup>1</sup> in order to resize its engagement effort or not.

Monthly reports on stakeholder engagement activities and claim management will be prepared by the Community Relations Service team for ESD management. These reports will contain:

- new entries in the claims register;
- new commitments and concerns to be addressed;
- new stakeholder groups (if identified);
- monitoring and evaluation indicators;
- plans for the next period or longer term.

The Community Relations Service team will also prepare a report on claims management and engagement activities that will be included in the environmental monitoring report submitted by GDIZ to the Beninese Environmental Agency.

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<sup>1</sup> Refers to a phenomenon where stakeholders consider themselves too solicited by the project, in order to participate in meetings or answer questionnaires, which harms them in their economic activities and can lead to their gradual disengagement from the dialogue process. This then materializes in a drop in their participation in organized events and a drop in overall interest in the project, which can sometimes lead some parties to neglect the defense of their own interests.

## Annex IV **List of fauna and flora protected species in Benin**

# **ANNEXE I :** **ANIMAUX INTEGRALEMENT PROTEGES : CATEGORIE A**

## **MAMMIFERES**

Eléphant	<i>Loxodonta africana</i>
Lamantin d'Afrique	<i>Trichechus senegalensis</i>
Chevrotain aquatique	<i>Hyemoschus aquatique</i>
Damalisque	<i>Damaliscus korrigum</i>
Sitatunga	<i>Limnotragus spekei</i>
Bongo	<i>Bocoercus euryceros</i>
Buffle de forêt ou buffle nain	<i>Syncerus caffer nanus</i>
Céphalophe à dos jaune	<i>Cephalophus sylvicultor</i>
Céphalophe bleu	<i>Cephalophus monticola</i>
Céphalophe noir	<i>Cephalophus niger</i>
Gazelle à front roux	<i>Gazella rufifrons</i>
Antilope royale	<i>Neotragus pygmaeds</i>
Potamochère	<i>Potamochoerus porcus</i>
Hylochère	<i>Hylochoerus meinertzhageni</i>
Guépard	<i>Acinonyx jubatus</i>
Panthère d'Afrique ou Léopard...	<i>Panthera pardus</i>
Lycaon ou Cynhyène	<i>Lycaon pictus</i>
Chat sauvage d'Afrique	<i>Felis lybica</i>
Caracal	<i>Felis caracal</i>
Ratel	<i>Mellivora capensis</i>
Chat doré	<i>Felis orata</i>
Mangoustes (toutes les espèces)	<i>Hespectinés</i>
Genette tigrine	<i>Fossa tigrina</i>
Orytomys	<i>Orytomys lechei</i>
Oryctérope	<i>Orycteropus afer</i>
Potto de Bosman	<i>Perodictious potto</i>
Singe à ventre rouge	<i>Cercopithecus erythrogaster</i> <i>erythrogaster</i>
Colobe Magistrat	<i>Colobus polikomus vellarosus</i>
Galago du Sénégal	<i>Galago senegalensis</i>
Chimpanzé	<i>Pan trogodytes</i>
Daman de rocher	<i>Proçavia capensis</i>
Daman d'arbre	<i>Dendrohyrax dorsalis</i>
Pangolin géant	<i>Manis gigantea</i>
Pangolin à écailles tricuspidés	<i>Manis tricuspis</i>
Anomalures (écureuils volants)	<i>Anomalurus derbianus et A. beecrofti</i>
Souris grasse du Nord-Ouest	<i>Steatomys caurinus</i>
Rat taupe du Togo	<i>Cryptomys zechi</i>
Athérure	<i>Atherurus africanus</i>
Baleine à bosse ou baleine jubarte	<i>Megaptera novaeangliae</i>
Cachalot	<i>Physeter macrocephalus</i>
Chauve souris	<i>Rhinolophus darlingi, Epomophorus</i> <i>labiatus et Hysignathus nmonstrosus</i>
Femelles et jeunes des mammifères partiellement protégés.	

## OISEAUX :

Tous les vautours

*Aegypius spp.*, *Gyps spp.*, *Neophron spp.* *Gypohierax spp.*

Tous les rapaces nocturnes (Ducs, hiboux, chouettes...strigiformes)

Strigidae

Les rapaces diurnes

- Balbuzard pêcheur
- Tous les busards
- Aigle pêcheur
- Bateleur

*Pandion haliaetus*

*Circus spp.*

*Haliaetus vocifer*

*Terathopius ecaudatus*

Francolin d'Ahanta

*Francolinus ahantensis*

Messenger serpenteaire ou Serpenteaire

*Sagittarius serpentarius*

Bec en sabot

*Balaéniceps rex*

Jabiru du Sénégal

*Ephippiorhynchus senegalensis*

Cigogne épiscopale

*Ciconia episcopus*

Grand calao d'Abyssinie

*Bucorvus abyssinicus*

Calao à huppe blanche

*Tropicranus albocristatus cassini*

Marabout

*Leptoptils crumeniferus*

Grue couronnée de l'Afrique de l'ouest

*Balearica pavonina*

Outardes (toutes les espèces)

Otididae

Ibis (toutes les espèces)

Threskiornithidae

Pintade huppée

*Guttera edouardi*

Cigogne noire

*Ciconia nigra*

Petit Jacana

*Micropara capensis*

Jacko

*Psittacus erithacus*

Touraco à huppe blanche

*Tauraco leucolophus*

Touraco vert

*Tauraco persa*

Sarcelle à oreillons

*Nettapus auritus*

Héron goliath

*Ardea goliath*

Grébifoulque

*Podica senegalensis*

Glaréoles

*Glareola spp.*

Pluvian d'Egypte

*Pluvianus aegyptus*

Gravelots

*Charadrius spp.*

Vanneaux

*Vanellus spp.*

Becassines  
Bacasseaux  
Chevaliers  
Courlis  
Barges  
Courvites  
Goéland brun  
Sternes  
Anhinga d'Afrique

*Gallinago spp.*  
*Calidris spp.*  
*Tringa spp.*  
*Numenius spp*  
*Limosa spp.*  
*Cursorius spp.*  
*Larus fuscus*  
*Sterna spp*  
*Anhinga rufa*

## REPTILES :

Crocodile du Nil  
Crocodile à long museau  
Crocodile cuirassé  
Caméleon  
Tortue luth  
Tortue olivâtre  
Tortue verte ou franche  
Tortue imbriquée  
Tortue géante terrestre

*Crocodylus niloticus*  
*Crocodylus cataphractus*  
*Osteolaemus tetraspis*  
*Chamaeleo gracilis gracilis*  
*Dermochelys coriacea*  
*Lepidochelys olivacea*  
*Chelonia mydas*  
*Eretmochelys imbricata*  
*Geochelone sulcata*



**ANNEXE II :  
ANIMAUX PARTIELLEMENT PROTEGES : CATEGORIE B**

**MAMMIFERES**

Hippopotame	<i>Hippopotamus amphibius</i>
Buffle de savane	<i>Syncerus caffer caffer</i>
Hippotragues ou Antilope cheval ou koba	<i>Hippotragus equinus</i>
Bubale	<i>Alcelaphus buselaphus</i>
Cobe Defassa ou Cobe onctueux ou waterbuck	<i>Kobus defassa</i>
Cobe de buffon	<i>Kobus kob</i>
Cobe redunca	<i>Redunca redunca</i>
Cobe des roseaux	<i>Redunca arundinum occidentalis</i>
Guib harnaché	<i>Tragelaphus scriptus</i>
Lion	<i>Panthera leo</i>
Galago de Demidoff	<i>Galagoides demidovii</i>
Colobes (sauf le colobe magistrat)	<i>Colobidae</i>
Singes (sauf le singe à ventre rouge, le babouin, le vervet et le patas)	<i>Cercopithecidae</i>
Hérissons	<i>Erinaceidae</i>
Chauve-souris	<i>Pipistrellus</i>
Phacochères	<i>Phacochoerus aethiopicus</i>
Potamochères	<i>Potamochoerus porcus</i>
Céphalophes	<i>Cephalophus et Sylvicapra</i>
Ourébi	<i>Ourebia ourebi</i>
Chacal commun	<i>Canis aureus</i>
Chacal à flancs rayés	<i>Canis adustus</i>
Renard	<i>Vulpes Pallida</i>
Loutre à joues blanches	<i>Lutra maculicollis</i>
Loutre à cou tacheté	<i>Lutra lutra</i>
Patas	<i>Erythrocebus patas</i>
Vervet	<i>Cercopithecus aethiops</i>



## OISEAUX

Héron (sauf héron goliath) et les Aigrettes

Pélicans

Cormoran africain

Grand comoran

Perroquets (sauf Jacko)

Rapaces diurnes (sauf baldazard pêcheur, Busards et Aigle)

Canard armé

Canard casqué

Emerauldine à bec noir

Emerauldine à bec rouge

Ombrette

Engoulevents

Avocette élégante

Dendrocygne veuf

Ardeidae

Pelicanidae

*Phalacrocorax*

*africanus*

*Phalacrocorax carbo*

Psittacidae

Accipitridae

*Plectropterus*

*gambensis*

*Saskidiornis melanota*

*Turtur abyssinicus*

*Turtur afer*

*Scopus umbretta*

*Caprimulgus spp.*

*Recurvirostra avosetta*

*Dendrocygna viduata*

## REPTILES

Python de seba

Python royal

Naja

*Python sebae*

*Python regius*

*Naja nigricollis et N. melanoleuca*

## CRUSTACES

Crabe terrestre

Crevettes d'eau douce

Crevettes d'eau saumâtre

Langoustes

*Cardiosoma armatum*

*Macrobrachium spp.*

*Penaeus monoton*

Toutes espèces

## POISSONS

Capitaine d'eau

Gymnallabes

Parauchenoglanus

Bagrus

Gymnarchus

Silure

Poisson électrique

*Lates niloticus*

*Gymnallabes typus*

*Parauchenoglanus fasciatus*

*Bragus bajad et Bagrus docmak*

*Gymnarchus niloticus*

*Heterobranchus longifilis*

*Malapterurus electricus*

## INSECTES ET ARACHNIDES

Scorpion impérial ou scorpion empereur

Phasmes

*Pandinus imperator*

Toutes espèces

### ANNEXE III :

#### ESPECES DITES "PETITS GIBIERS" : NON PROTEGEES

##### MAMMIFERES

Chats sauvages (sauf chat doré et caracal)	<i>Felis spp.</i>
Lièvre	<i>Lepus crawshayi</i>
Aulacode	<i>Thryonomis swinderianus</i>
Ecureuil Fouisseur	<i>Xerus erytropus</i>
Zorille commun	<i>Ictonyx striatus</i>
Genettes	<i>Viverrinae</i>
Civettes	<i>Nandininae</i>
Cynocéphale ou babouin	<i>Papio anubis</i>
Chauves-souris (sauf <i>Neoromicia somalicus</i> et <i>Rhinolophus darlingi</i> )	

##### OISEAUX

Dendrocynnes (sauf Dendrocygne veuf), canards et oies	<i>Anatidae</i>
cailles, poules de roche, francolins, (sauf francolin d'anhanta) et pintades (sauf pintade huppée)	<i>Phasianidae</i>
Râles	<i>Rallidae</i>
Oedicnèmes	<i>Burhinidae</i>
Pigeons, tourterelles	<i>Columbidae</i>
Gangas	<i>Pteroclididae</i>
Touracos sauf touraco à huppe blanche	<i>Cuculidae</i>
Alouettes	<i>Alaudidae</i>
Jacanas (sauf petit Jacana)	<i>Jacanidae</i>

##### REPTILES

Varans	<i>Varanus niloticus</i> et <i>V. exanthematicus</i>
Serpents (Vipères)	<i>Viperidae</i>
Tortues (sauf tortues marines et grande tortue terrestre)	Cheloniens
Grenouilles	Batraciens

##### INSECTES ET ARACHNIDES :

Insectes utiles (abeilles, mante religieuse, termite, mygale, ...)

## ANNEXE IV : ANIMAUX "NON GIBIER"

### MAMMIFERES

Tous ceux qui ne figurent pas aux annexes I, II et III notamment

Hérissons.....	Erinacéidés
Chauves souris.....	Chiroptères
Rats, souris et gerbilles.....	Muridés
Musaraignes.....	Soricidés
Gerboises.....	Dipodidés
Loirs.....	Muscardinidés
Athérures.....	Athérura africana
Ecureuil (sauf écureuil fouisseur).....	Sciuridés
Ecureuil volant.....	Anomaluridés

### OISEAUX

Cigognes et spatules	
Anhinga.....	Anhinga rufa
Jacanas.....	Jacanidés
Echasse.....	Himantopus
Accipitriformes (autres Aegypiidés, strigiformes, Aigles et Serpentaires)	
Coraciadiformes (Martins pêcheurs, Rolliers, guêpiers, calaos) (sauf grand calao d'Abyssinie, huppés moqueurs)	
Caprimulgiformes (Engoulevents)	
Micropodiformes (Martinets)	
Trogoniformes ou gripeurs (pics, torcols, barbus, barbucans)	
Passeriformes (tous sauf les alouettes)	
Colliformes (Colicus)	
Cuculiformes (sauf musophagidés = touracos)	

### REPTILES

Serpents (sauf pythons).....	Ophidiens
Lézards (sauf varans).....	Sauriens
Agames.....	Sauriens
Gecko	

## Annexe - Liste des espèces forestières protégées

Noms vulgaires	Noms botaniques	Produits principaux	Observations
Iroko	Milicia Excelsa	Bois d'oeuvre	Rare
Acadjou à grande feuilles	Khaya grandifolia Khaya senegalensis		Feuilles
Kapokier Bois de coffrage	Bombax chevalieri	Bois de coffrage	
Palmier à huile Samba Triplochiton scleroxylon	Elaeis guineensis Triplochiton scleroxylon	Vin et alcool	Multiples usage
Fraké	Terminalia superba Afzelia africana	Bois de coffrage	
Lingue	Afzelia africana		
Antiaris	Antiaris toxicaria		
Vene Ptérocarpus erinaceux Fromager Nere ou Nete	Ptérocarpus erinaceux Ceiba pendandra Parkia Biglobosa		
Isoberlina Berlina Berlinia doka	Isoberlinia doka Berlinia doka		
Syzigium	Berlina grandioïlora		
Colatier syzygium guineense Daniellia Kola nitida	Syzygium guineense Kola nitida		
Faux Ebene	Danieallia aliveri		
Linsa	Diospyros mespiliformis		
Dialium Essence fruitière	Blighia sapida	Essence fruitière	
Anogeissus Prunier Mombin Anogeissus Ronier Spondias mombin	Dalium guineese Anogeissus- leiocarpus-bois Spondias mombin		
Gao	Borassus aethiopum		
Manilkara Multivernis	Acacia albida	Bois	
Butyrospermum parad Palmier doumb Palmier Raphia	Butyrospermum parad Hyphaene thebaica Raphia sudanica	Fruits et liège Karité Bois de vin	
Bambou	Bamбуza vulgaris		
Oxymenthera	Oxythenanthera - abyssinica	Bois	
Prosopis	Prosopis africana	Bois et fourrage	
Vitex	Vitex doniana	Légumebois-fruit	
Mytragina	Mytragina inermis et ciliata	Bois et plante médicinale et reboisement	Rare
Bete Dabema	Mansonia altissima Piptadeniastrum africanum	Bois Essence très rare bois dur	Essence rare
Encephalartos Paletuviers “ “ “	Encephalartos Bateri Rhizophora sp Avicenia africana Connocarpus spp Laguncularia Racemosa	Ornemental Bois et protection des rives puis frayère “ “ “	

Holoptea	Holoptelia grandis	Bois	
Nesogordinia	Nessogordonia	Bois	
Dingoun	Papaverifera	Bois et plantes	
Lindja	Macrophyla Tetraptera	médicinales Plantes médicinales et fruits	
Albizia	Albizia spp	Bois ornemental ombrage	
Fagara	Xanthexylum Xanthoxyloides	Bois Médicinale Fourrage	

## Annex V **Field sheet for avifauna and mammals census**



# FICHE D'INVENTAIRE ORNITHOLOGIQUE

Site :		Heure départ :
Date :		Heure de fin :
Equipe :	Responsable :	
	Membre	
Temps :	Nuageux	
	Ensoleillé	
	Pluie	
	Brume	
Cordonnée GPS :	Départ	
	Arrivé	

[illegible]

# FICHE D'INVENTAIRE MAMMIFERES PAR CAMERA PIEGE

Date : ...../ ...../ 202.....

Heure : .....

Site :

.....

Coordonnées GPS :

.....

Code (caméra) :

.....

Niveau (%) de la batterie :

.....

Nombre de batterie (piles) :

.....

Collecteur :

.....

Nombre de photos prise :

.....

## Annex VI **Biodiversity report – rainy season**

**République du Bénin – Projet d'aménagement et de viabilisation de  
la zone industrielle de Glo-Djigbé dans les communes de Tori-  
Bossito et de Zè**



**RAPPORT DE BIODIVERSITE ET SAISONNALITE**



**Septembre 2020**

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Annexe 3.b : Liste des espèces de flore protégées au Bénin

# 1. Introduction

## 1.1. Contexte et justification

« La flore d'une région est la conséquence de l'histoire de l'évolution des formes de vie en relation avec les conditions mésologiques » (A. Akoègninou et al., 2006, p. XI). La saisonnalité du régime des précipitations est une des principales caractéristiques de l'Afrique de l'Ouest. Russel-Smith (1991, p. 261), à travers ses travaux sur la structure de la végétation a montré que « la distribution géographique des communautés végétales est régie par des facteurs biotiques et abiotiques et leur discrimination constitue dès lors la meilleure analyse des relations entre la végétation, les facteurs climatiques, édaphiques, topographiques et humains ».

Le site du projet (1467 ha) est une zone agricole caractérisée par la présence des plantations d'ananas (plantation dominante), des plantations du manioc, des plantations de palmiers à huile et d'arbre (acacia, teck et Eucalyptus), des cultures vivrières (maïs, arachide etc). Quelques habitations s'y retrouvent ainsi des fermes d'élevage et de transformation de produits agroalimentaires. A tout ceci s'ajoute des jachères et un (01) îlot forestier sacré de petite taille (4 ,93 ha) (figure 1).

L'étude d'impact environnemental et social réalisé en 2019 par Antea Group a révélé que les travaux de construction de cette zone industrielle puis son exploitation vont provoquer des impacts aussi bien positifs que négatifs sur l'environnement et les populations concernées.

Les impacts sur la flore et la végétation interviendront principalement en phase de préparation et de construction lorsqu'il faudra procéder au dégagement de l'emprise qui consistera au débroussaillage, l'abattage et le dessouchage des arbres préalablement aux activités de terrassement. Ces opérations entraîneront une perte de ressources forestières dont certaines sont protégées par la réglementation béninoise. Le couvert végétal sera également partiellement perdu, entraînant une perte d'habitats naturels pour les espèces de petits mammifères, d'oiseaux, de reptiles, d'insectes et de papillons qui peuplent la zone du projet. Cet impact aura une incidence forte sur la biodiversité floristique locale qui, bien qu'elle reste limitée, sera perdue définitivement.

Dans ce contexte de forte pression anthropique, il se pose fondamentalement la question de l'état des formations végétales naturelles. Il est alors opportun de connaître les caractéristiques de ces formations naturelles, la faune qu'elle abrite ainsi que les variations liées à la saisonnalité.



Figure 1 : Entrée de la forêt sacrée (à gauche) et physionomie de la forêt (à droite)

## **1.2. Objectifs de l'étude**

### **1.2.1. Objectif global**

L'objectif global de la présente étude est de caractériser la biodiversité naturelle résiduelle du site.

### **1.2.2. Objectifs spécifiques**

De manière spécifique, il s'agira de :

- De recenser les espèces de faune et de flore présentes dans la zone en saison des pluies (mai à mi-juillet) afin de compléter l'inventaire réalisé en saison sèche (novembre 2019).
- Procéder à un recensement des espèces de flore au niveau de la forêt sacrée d'Anavié.
- Compléter les données de recensement de la faune mammalienne en utilisant les techniques de piégeage et de capture vidéo.
- Procéder à un recensement des espèces d'avifaune présentes sur le site du projet par un ornithologue.

## **1.3. Hypothèse d'étude**

L'étude est fondée sur l'hypothèse qui prédit que la biodiversité du site a perdu ses spécificités floristiques, phytogéographiques, faunistiques et connaît des variations significatives selon qu'on soit en saison sèche ou en saison pluvieuse.

## 2. Démarche méthodologique

### 2.1. Méthodologie de collecte de données sur la flore

#### 2.1.1. Choix des placeaux

Les relevés phytosociologiques ont été réalisés dans les secteurs ayant fait objet d'étude lors de la première phase de collecte de données (novembre 2019) et dans la forêt sacrée d'Anavié. Trois secteurs échantillonnés lors de la première phase ont été retrouvés convertis en terre agricole (occupation par des cultures de maïs et ananas). Ces secteurs étaient des reliques de végétations naturelles à dominance *Alibizia spp.*, *Chromolaena odorata* et *Mallotus oppositifolius*. A cet effet, de nouveaux points ont été identifiés et ont fait objet d'étude. Globalement, les relevés ont été réalisés dans tous les secteurs disposant encore de végétation naturelle sur le site. La taille des relevés a été déterminée en tenant compte des travaux effectués en milieu tropical par plusieurs auteurs (B. Sinsin, 1993, p. 36 ; I. Toko Imorou, 2008, p. 43 ; O. Arouna, 2012, p. 39) qui ont utilisé des surfaces variant entre 100 m<sup>2</sup> et 900 m<sup>2</sup> selon les formations végétales et les strates. Trois strates ont été prises en compte : la strate herbacée, la strate arbustive et la strate arborée. Au niveau de la forêt sacrée d'Anavié, il a été constaté la présence d'un point d'eau temporaire (se forme pendant la saison des pluies) au niveau du noyau. Afin de respecter l'aire de relevé des strates arborée et arbustive comme pour les forêts galeries (O. Arouna, 2012, p. 39) un plateau rectangulaire de 45 m x 20 m a été installé pour évaluer les espèces présentes le long du point d'eau temporaire. Le nombre de placeaux par formation végétale a été déterminé sur la base de l'étendue des formations végétales. Les placeaux ont été installés en tenant compte de l'homogénéité floristique et topographique des stations. Au total, 10 placeaux ont été installés à travers les différentes formations végétales dont trois au niveau de la forêt sacrée. Parmi ces 10 placeaux, 5 ont déjà fait objet d'étude en saison sèche et ont été étudiés à nouveau. A ces 5 placeaux ce sont ajoutés 5 nouveaux points. L'objectif de départ était de reprendre les relevés au niveau de tous les points ayant fait objet d'étude en saison sèche. Mais sur le terrain, le constat était que trois (3) ont été convertis en terre agricole. Raison pour laquelle d'autres points ont été identifiés.

#### 2.1.2. Méthode d'inventaire phytosociologique et d'inventaire des ligneux

L'inventaire phytosociologique a été réalisé selon la méthode sigmatiste de Braun-Blanquet (H.E. Weber et al., 2000, p. 744). Les relevés ont été réalisés dans la grande saison pluvieuse afin de pouvoir faire des comparaisons avec les données de novembre 2019 (saison sèche). Pour chaque relevé, la texture du sol et le type de formation végétale ont été notés. Les types phytogéographiques des espèces sont établis à partir des subdivisions chorologiques de F. White (1983, p. 38).

Dans chaque placeau, une identification des espèces végétales a été faite et les coefficients d'abondance – dominance ont été attribués en fonction des recouvrements. En cas de difficulté d'identification d'une espèce, des échantillons ont été collectés et des photos des parties clés ont été faites en vue d'une identification approfondie ultérieure. Les spécimens des espèces qui n'ont pas été identifiés directement sur le terrain ont été prélevés pour une identification approfondie dans les laboratoires appropriés de l'Université d'Abomey-Calavi.



Les mesures dendrométriques (dbh, hauteur fût et hauteur totale) ont été prises sur tous les arbres de diamètre (diamètre à 1,30m au-dessus du sol) supérieur ou égal à 10 cm () au niveau de chaque plateau.

Les données de présences des espèces de faune et traces de faune (empreintes, crottes, reliques, restes d'alimentation) dans le milieu ont été également collectées.

Les coordonnées géographiques, photos et état de conservation du milieu (naturel, semi naturel, anthropisé, protégé ou non) ont été notés sur les fiches de terrain. Les coordonnées des plateaux ainsi que les surfaces de relevé sont consignés dans le tableau 1. Ces coordonnées ont été utilisé par la suite pour réaliser la carte montrant l'emplacement des plateaux sur le site ( figure 1)

**Tableau 1 : Coordonnées (en UTM) et surface des relevés phytosociologiques**

Points	Localités	Latitude	Longitude	Surface de relevé (en m <sup>2</sup> )
R1	TORI	415843,065	725692,128	900
R2	TORI	414156,26	726389,553	900
R3	TORI	415656,555	725671,222	900
R4	ZE	416824,064	727137,985	900
R7	ZE	416465,847	728958,065	900
N1	TORI	415650,557	725483,473	900
N2	TORI	414387,674	727327,436	900
N3	ZE	418076	729229	900
N4	ZE	418093	729292	900
N5	ZE	418179	729274	900

R1 ...R7 : Points échantillonnés en saison sèche et en saison des pluies

N1, ...N5 : Nouveaux points échantillonnés

(Source : Antea, juillet 2020)

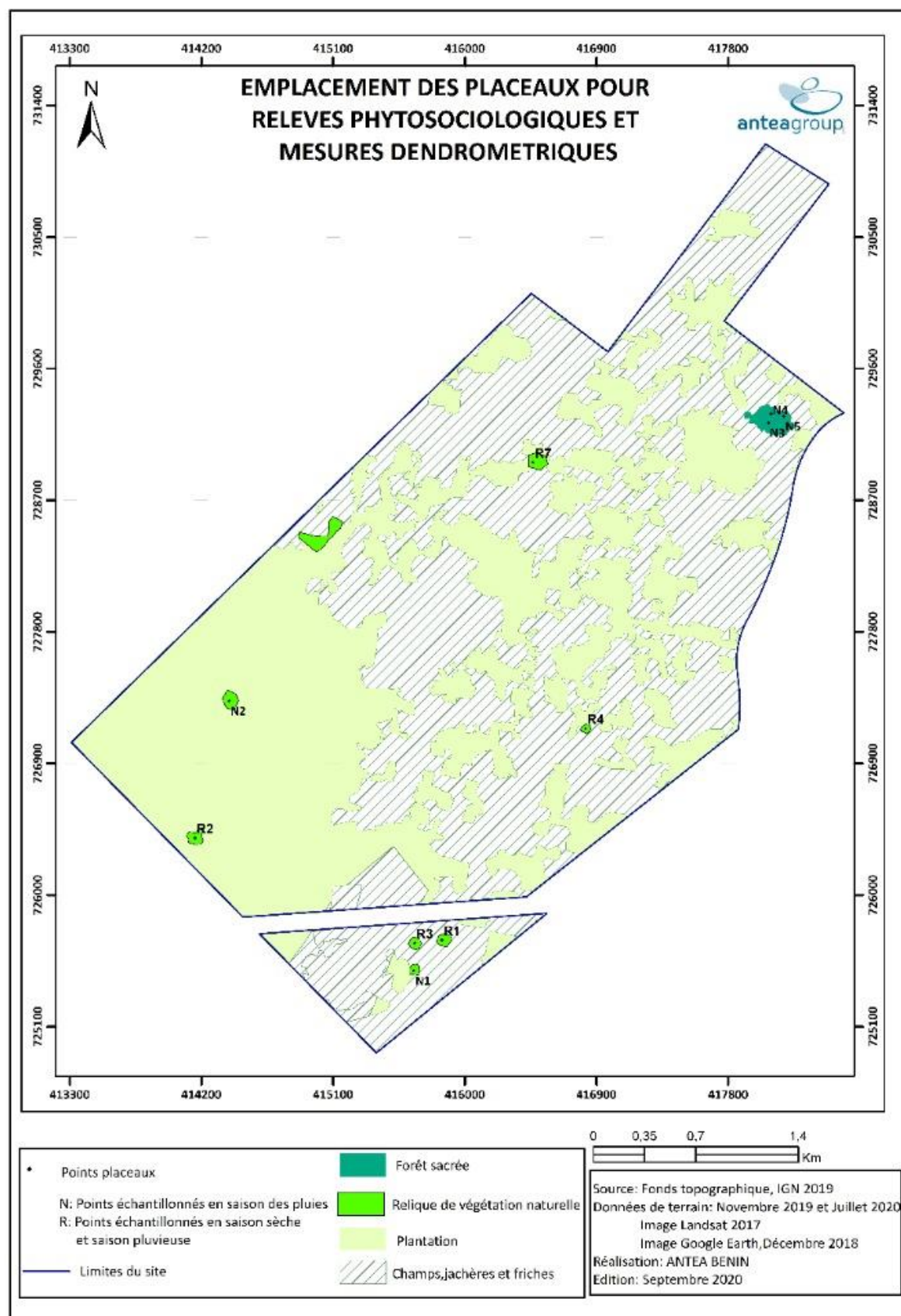


Figure 2 : Emplacements des placeaux pour les relevés phytosociologiques et mesures des paramètres dendrométriques

### 2.1.3. Méthode de traitement des données phytosociologiques

Le traitement des données phytosociologiques a consisté à identifier les espèces caractéristiques au niveau de chaque relevé, à évaluer les spectres des types biologiques et phytogéographiques et la diversité spécifique de la flore présente sur le site.

La composition et la diversité floristique ont été analysées à partir du nombre total de familles, de genres et d'espèces, de la richesse spécifique (R), de l'indice de diversité de Shannon (H), de l'équitabilité de Pielou (E), indice de dominance de Simpson et l'indice de diversité de Simpson.

#### 2.1.3.1. Indice de diversité de Shannon

La diversité de Shannon (H) a permis de mesurer la diversité spécifique au niveau des formations végétales. Elle a été calculée à partir de la formule suivante :

$$H = -\sum P_i \log_2 P_i$$

Avec  $P_i = n_i/N$  ;  $n_i$  = nombre d'individus / espèce ;  $N$  = nombre d'individus / placeau.

L'indice de Shannon (H) est compris entre 0 et 6 bits. H est faible s'il est inférieur à 2,5 bits et indique un milieu spécialisé ; H est moyen lorsqu'il est compris entre 2,5 et 4 bits ; H est élevé s'il est supérieur à 4 bits et indique un milieu isotrope c'est-à-dire une absence de dominance.

#### 2.1.3.2. Indice d'équitabilité de Pielou

L'équitabilité de Pielou ou régularité est une mesure du degré de diversité atteint par le peuplement et correspond au rapport entre la diversité effective (H) et la diversité maximale théorique ( $H_{\max}$ ).

$$E = H/H_{\max}$$

Avec  $H_{\max} = \log_2 S$  qui est la valeur théorique de la diversité maximale pouvant être atteinte dans chaque groupement et S le nombre d'espèces végétales recensées par placeau.

Pour le peuplement considéré,  $H_{\max}$  est la valeur maximale que peut prendre l'indice de Shannon et S le nombre d'espèces d'arbres ou la richesse spécifique. L'indice  $E_q$  varie de 0 à 1 (Pielou, 1966).

- Si  $E_q$  est compris entre 0 et 0,6 alors l'équitabilité de Pielou est faible (phénomène de dominance existant dans la communauté) ;
- Si  $E_q$  est compris entre 0,7 et 0,8 alors l'équitabilité de Pielou moyenne ;
- Si  $E_q$  est compris entre 0,8 et 1 alors l'équitabilité de Pielou est élevée et il y a absence de dominance dans la communauté (Pielou, 1966).

### 2.1.3.3. Indice de dominance de Simpson

L'indice de dominance de Simpson (D), mesure la dominance de la communauté par un groupe d'espèces :

$$D = \sum P_i^2 ; (\text{Simpson, 1949})$$

Avec  $n_i$  l'effectif des individus de l'espèce  $i$  et  $N$  l'effectif total de tous les individus de toutes les espèces. L'indice de dominance de Simpson est compris dans l'intervalle  $[0 ; 1]$ . Sa valeur 0 est le maximum de dominance et sa valeur 1 est le minimum de dominance. Sa valeur diminue avec la régularité de la distribution (Simpson, 1949). L'indice de diversité de Simpson  $1/D$  donne la mesure du nombre réel d'espèces dominantes.

### 2.1.3.4. Caractérisation de la structure de la végétation sur le site

#### 2.1.3.4.1. Structure en classe de diamètre

Les structures en diamètre sont en général des histogrammes construits à partir des fréquences relatives de classes de circonférence d'amplitude égale. Dans le but d'une caractérisation détaillée de la structure des formations végétales ayant fait objet d'étude, des histogrammes basés sur la densité en tiges des différentes classes de diamètre observées, ont été réalisés. Pour cela, les arbres ont été regroupés par classes de 10 cm d'amplitude. Les densités observées ont été calculées par classe de diamètre selon la formule suivante :

$$d_{\text{obs}i} = \frac{n_i}{n_p s}$$

Où  $d_{\text{obs}i}$  = densité observée en arbres/ha de la classe  $i$  ;  $n_i$  = nombre d'arbres dénombrés pour la classe  $i$  ;  $n_p$  = nombre total de placeaux considérés et  $s$  = superficie d'un placeau en ha.

Ces distributions ont été ajustées à la distribution de Weibull à trois paramètres ( $a$ ,  $b$ ,  $c$ ) en vue d'une bonne appréciation. La fonction de densité de probabilité de cette distribution est (Johnson et Kotz, 1970) :

$$f(x) = \frac{c}{b} \left( \frac{x-a}{b} \right)^{c-1} \exp \left[ - \left( \frac{x-a}{b} \right)^c \right] \quad \text{Où}$$

$x$  = diamètre des arbres;  $a$  = 10 cm pour les structures en diamètre ;

$b$  = paramètre d'échelle lié à la valeur centrale des diamètres;

$c$  = paramètre de forme lié à la structure en diamètre considérée.

#### 2.1.3.4.2. Structure de la dominance des arbres de la forêt d'Anavié

Pour caractériser la structure de la dominance des arbres, l'indice de valeur d'importance (species importance value index, IVI) de chaque espèce de la forêt a été calculé et présenté sous forme graphique.

L'indice de valeur d'importance (**IVI**) = dominance relative + densité relative + fréquence relative

Les formules permettant de calculer les différents paramètres de IVI se présentent comme suit :

- Dominance relative =  $\frac{\text{surface terrière totale d'une espèce}}{\text{Surface terrière totale de toutes les espèces}}$
- Surface terrière =  $\frac{\pi D^2}{4}$
- Densité relative =  $\frac{\text{Nombre d'individus d'une espèce}}{\text{Nombre total d'individus}}$
- Fréquence =  $\frac{\text{Nombre de relevés dans lequel l'espèce est présente}}{\text{Nombre total de relevés}}$
- Fréquence relative =  $\frac{\text{Fréquence d'une espèce}}{\text{Somme de toutes les fréquences}}$

Théoriquement la dominance relative, la densité relative, la fréquence relative et la dominance relative varient de 0 à 1 ainsi l'IVI des espèces varie de 0 à 3 (Kabore et al., 2013).

### 2.1.3.4.3. Evaluation de la similarité en rapport à la saisonnalité

Pour évaluer la similarité entre la composition floristique des relevés effectués en Novembre 2019 et en Juillet 2020, l'indice de similarité de Jaccard (Jaccard, 1990) a été calculé par la formule suivante :

$$ISJ = \frac{a}{a + b + c}$$

Avec a = nombre d'espèces communes aux relevés A (réalisé en novembre 2019) et B (réalisé en juillet 2020) ; b = nombre d'espèces exclusives aux relevés réalisé en Novembre 2019 ; c = nombre d'espèces exclusives aux relevés de Juillet 2020.

Cet indice ISJ varie de 0 à 1 et ne tient compte que des associations positives. Si l'indice augmente, alors un nombre important d'espèces se rencontre dans les deux saisons évoquant ainsi que la biodiversité inter saison est faible. Dans le cas contraire, si l'indice diminue, seul un faible nombre d'espèces est présent sur les deux saisons.

Un positionnement multidimensionnel nonmetric NMDS (Minchin, 1987) a été également réalisé pour apprécier le positionnement dimensionnel des similarités et des dissimilarités au niveau des compositions floristiques. Ensuite une ANOSIM (Analysis of Similarity) a été faite pour tester la significativité des différences en termes de composition floristique en relation aux saisons des relevés.

La mise à l'échelle multidimensionnelle non métrique (NMDS) est une approche d'analyse de gradient indirecte qui produit une ordination basée sur une matrice de distance ou de dissimilarité. Contrairement aux méthodes qui tentent de maximiser la variance ou la correspondance entre les objets dans une ordination, NMDS tente de représenter, aussi étroitement que possible, la dissemblance par paires entre les objets dans un espace de faible

dimension. Tout coefficient de dissimilarité ou mesure de distance peut être utilisé pour construire la matrice de distance utilisée comme entrée.

L'analyse des similitudes (ANOSIM) est un test statistique non paramétrique largement utilisé dans le domaine de l'écologie. Le test a d'abord été suggéré par K.R. Clarke comme un test de type ANOVA (Analysis of variance), où au lieu d'opérer sur des données brutes, opère sur une matrice de dissimilarité classée.

### **2.1.3.5. La liste des espèces de flore et de faune endémiques, rares, menacées**

La liste des espèces de flore et de faune endémiques, rares, menacées a été réalisée par rapport au statut des espèces dans les documents de références tels que :

- Liste rouge de l'IUCN ([www.redlist.org](http://www.redlist.org))
- Liste rouge du Bénin,
- Espèces CITES,
- Décret 2011-394 fixant les modalités de conservation, de développement et de gestion de la faune et de ses habitats en République du Bénin.
- Décret n° 96-271 du 2 juillet 1996 portant modalités d'application de la loi n°93-009 du 2 juillet 1993 portant Régime des Forêts en République du Bénin,

## **2.2. Méthodologie de recensement des oiseaux**

### **2.2.1. Matériel**

Plusieurs matériels ont été nécessaires dans le cadre de l'inventaire et le dénombrement de la faune aviaire. Il s'agit notamment de :

- un appareil photo réflex avec un objectif puissant, de 55 à 300 mm ;
- un guide d'identification (BORROW N. et DEMEY R., guide des oiseaux de l'Afrique de l'Ouest, 2015) pour identifier les oiseaux photographiés ;
- une paire de jumelles pour observer les oiseaux de loin afin de les identifier (Cf. figure 3) ;
- un système de positionnement par satellite (Garmin 62s) pour enregistrer les coordonnées de départ/arrivé des transects ainsi que des points d'observation d'oiseaux spécifiques ;
- des fiches pour la collecte des informations sur les espèces et leur habitat.





(Source : Antea, juillet 2020)

**Figure 3 : Photographie d'une paire de jumelles utilisée pour observer les oiseaux**

### 2.2.2. Méthode

La méthode utilisée pour l'inventaire des oiseaux diurnes est inspirée de l'Indice Kilométrique d'Abondance (IKA) qui fait appel à des line-transects, élaborée par Ferry et Frochot (1958). Celle adoptée pour les sorties nocturnes est l'Indice Ponctuel d'Abondance (I.P.A.) qui fait appel à des points d'écoutes mise en place par Ferry et Frochot (1958).

Deux sorties (une le matin et une l'après-midi) par jour était prévues, mais compte tenu des difficultés liées à la circulation sur les transects (traverse des champs d'ananas) l'équipe de dénombrement était dans l'obligation de faire une sortie par jour. Toujours pour rester dans l'optique de départ, cette seule sortie a été organisée de la manière suivante : le matin du jour 1 sur un transect et l'après-midi du jour 2 sur le transect le plus proche (500m à 1km au plus). L'inventaire étant ponctuel (pas un suivi périodique) cet écartement permet de maximiser (en balayant presque toute la zone) le nombre d'espèce à observer.

L'application de la technique a permis de balayer la zone de 1km sur 2 - 3km en un jour complet. Les transects ont été pré-tracés et importés dans l'application LocusMap. Ceci a permis de marcher plus ou moins en ligne droite et non pas utilisé les sentiers existants sur le site.

#### 2.2.2.1. Collecte de données

Durant la prospection ornithologique, une liste exhaustive des espèces observées a été établie pour chaque journée de travail. La fiche élaborée et utilisée est présentée en annexe (2b) au rapport. Le nombre d'individus ou de groupes a été noté. Ces informations ont permis de produire l'indice d'abondance basé sur le taux de rencontre (nombre de jours pendant lesquels l'espèce est notée et nombre d'individus et de groupes concernés). La nomenclature suit celle de Borrow et Demey (2001) et les catégories d'abondance utilisées sont celles de Demey et Rainey (2005). Des photos ont prises pour conforter les identifications.

### 2.2.2.1.1. Transects et points d'écoute

#### Sortie diurne (transect)

Huit (8) transects de 2 à 3 km ont été parcourus avec une vitesse de 1km/h en marquant un arrêt tous les 20 mètres. Pour les huit (08) transects, cinq (05) ont été parcourus dans la matinée et trois (03) dans l'après-midi pour maximiser le rendement en terme de contact des espèces. Toutes les espèces observées et entendues le long des transects ont été inventoriées. L'inventaire a été fait des deux côtés de l'axe de progression. Les observations sur le terrain ont débuté au lever du soleil à 07h00'et dans l'après-midi à partir de 15h. Ces horaires ont été choisis en se référant à l'étude menée par AHON et al. (2012) qui stipule que le travail sur le terrain s'effectue généralement de 06 h 30min à 11 h 00 et de 15 h à 18 H 00.

#### Sortie nocturne (point d'écoute)

En vue d'appréhender l'existence d'éventuels rapaces nocturnes des sorties nocturnes ont été jugées pertinentes. Deux (02) sorties nocturnes ont été effectuées dans le cadre de l'inventaire des oiseaux sur le site. Elles ont été réalisées en deux séquences : 20 heures à 23 heures et 00 heures à 5 heures. Les points d'écoutes ont été placés autour du grand îlot forestier sacré du site car c'est le seul endroit où il y a la présence de grands arbres pouvant abriter les rapaces. Toutes les espèces entendues ont été enregistrées sur chaque point pendant une durée de 20 minutes. A cet effet un enregistreur de son (le dictaphone) a été utilisé pour enregistrer les chants et/ou cris des oiseaux inconnus qui ont été identifiés plus tard à la base grâce aux CD-ROM de Claude CHAPPUIS (Chappuis, 2000), joué en play-back (repassage de vocalisation), ce qui a permis aux espèces éloignées de se rapprocher pour une meilleure observation et identification. La sortie nocturne a été jugée pertinente en vue d'appréhender l'existence d'éventuels rapace nocturnes.

La figure 4 présente les transects et les points d'écoutes réalisés dans le cadre de la prospection ornithologique

### 2.2.2.1.2. Identification des espèces recensées

Sur la base du guide d'identification (BORROW N. et DEMEY R., guide des oiseaux de l'Afrique de l'Ouest, 2015) Il a été procédé à l'identification des espèces surtout photographiée. La base photo d'oiseaux de CREDI-ONG a été également utilisée.

### 2.2.2.1.3. Traitement des données

Les données ont été saisies et traitées via le tableur Excel pour faire des graphes et sortir les statistiques appropriées.

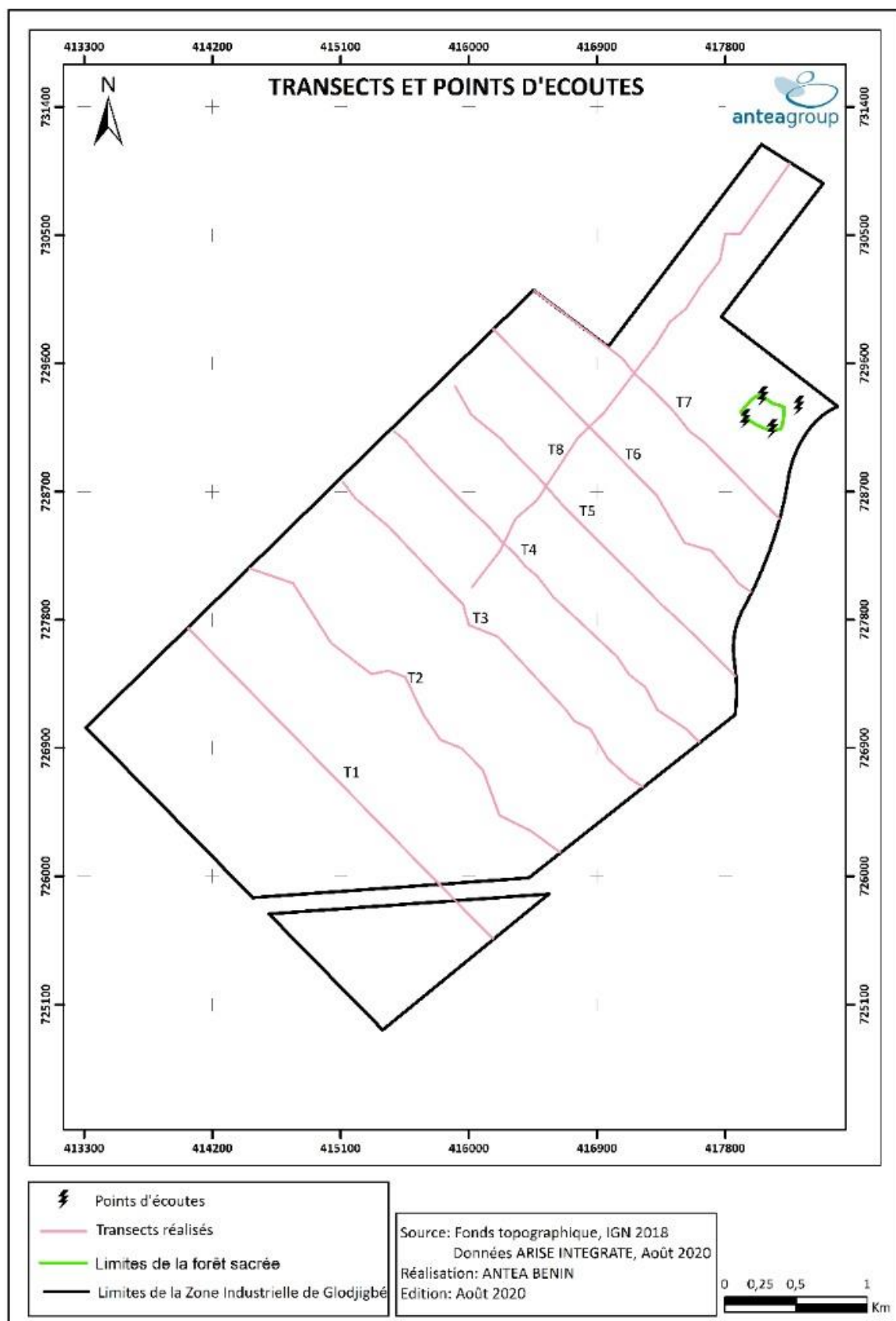


Figure 4 : Carte montrant les transects et points d'écoutes utilisés pour la prospection ornithologique

## 2.3. Recensement des mammifères

### 2.3.1. Matériels

Dans le cadre du recensement des mammifères, plusieurs matériels ont été nécessaires. Il s'agit notamment de :

- des caméras pièges pour réaliser la capture automatique des animaux (Caméra de trail HD 16MP/12MP/8MP 1080p avec vision nocturne infrarouge de 1,8 m, étanche, grand angle 120° Extérieur 0,3 s activé par mouvement de chasse avec écran LCD 2,0")
- un guide d'identification des mammifères de l'Afrique de l'Ouest et la base photo faune de CREDI-ONG ;
- un système de positionnement par satellite (Garmin GPSmap 62s) ;
- 10 pièges de type non vulnérants.



(a) Caméra piège



(b) Piège de capture non vulnérant

(Source : Antea, juillet 2020)

Figure 5 : Matériels de collecte de données sur les mammifères

### 2.3.2. Méthodes

Deux techniques d'inventaire ont été utilisées dans le cadre de la présente étude.

#### 2.3.2.1. Méthode basée sur l'utilisation des caméras pièges

Cette méthode est de plus en plus utilisée pour des études sur la faune (Oliveira-Santos et al., 2008, O'Connell et al., in press, Rovero et al., 2010). La caméra infra-rouge est un appareil qui est déclenché suite à un mouvement focalisé dans le champ de vision de la caméra (Chapman, 1927, cité par Rowcliffe et Carbone, 2008 et par Nkwetaketu, 2011). La photo est extrêmement précieuse pour enregistrer les espèces difficiles à dépister. La pose d'appareils à déclenchement automatique permet de surveiller avec peu de personnel les sites fréquemment visités par les animaux (par exemple, les affleurements de sel), les sites appâtés et leurs lieux de passage habituels. Les pièges photo permettent aussi de déterminer les schémas d'activité (diurne, nocturne ou crépusculaire), les réactions aux perturbations (par exemple Griffiths, 1994), les déplacements, les comportements de reproduction saisonniers et les structures sociales. Les caméras trappes qui sont utilisés sont équipées d'un détecteur de mouvement ou un détecteur infrarouge qui s'active à distance (Sogbohossou et al., 2017, Oliveira-Santos et al., 2008, O'Connell et al., in press, Rovero et al., 2010). Elles ont été paramétrées afin de prendre une photo toutes les 10 secondes (intervalle/retard) et sur

chacune d'elles apparaît : la date, l'heure, et la température du milieu ambiant au moment de la prise (Ndiaye et al., 2018).

### **2.3.2.2. Méthode basée sur l'utilisation de pièges non vulnérants**

Les pièges utilisés dans le cadre de cette étude sont des pièges non vulnérants qui permettent donc de capturer les micromammifères vivants et de les relâcher. En plus d'être plus respectueux de la biodiversité du site étudié, ces pièges semblent être, en l'état actuel des connaissances, plus efficaces pour la capture des micromammifères que les pièges mortels (Ling-Ling, 1997).

Dans le cadre du présent inventaire, dix (10) pièges actifs standards non vulnérant de dimension 35cm x 35 cm x 55 Cm, ont été confectionnés. Ces pièges sont préconisés dans l'étude des petits mammifères non volants. Ils se présentent sous la forme d'une cage fermée grillagée ou entourée de fer munie d'une porte à détente qui permet de fermer le piège derrière l'animal lorsque celui-ci s'attaque à la plaquette appâtée à l'intérieur. De par sa structure, ce type de piège est destiné à priori à la capture des petits mammifères (rongeurs).

Après capture, les animaux sont identifiés et relâchés dans la nature. L'identification a été faite à l'aide du guide d'identification des mammifères de l'Afrique de l'Ouest et de la base photo faune de CREDI-ONG.

### **2.3.2.3. Point d'implantation des caméras, des pièges et organisations pratiques**

Avant d'installer les caméras ou les pièges, il a été procédé à une identification préalable des points idéaux de pose. La sélection des points d'implantation est guidée par la recherche des indices de présence (crottes, empreintes, dortoir, reste de nourriture, présence de nourriture). Les connaissances des guides de terrain (chasseur de la zone) ont été également mises à contribution dans l'identification des lieux de pose. Au total 13 point ont été identifiés dans trois habitats différents (jachères/champs, plantation d'acacia et relique de forêt). Dix (10) caméras ont été installées dans les trois habitats différents (5 caméras dans la forêt, 3 dans les plantations et 2 dans les champs/jachères). Les coordonnées de chaque caméra et/ou piège ont été prises à l'aide d'un GPS. Les points de pose des caméras sont présentés par la figure 7.

Après vérification de l'état des piles et des capteurs, les caméras ont été installées à environs 50 cm au-dessus du sol (Nakashima, 2013, Hongo et al., 2016, Mindonga Nguelet et al., 2016). Ils ont opéré 24 heures par jour et ont été vérifiées tous les 5 jours. Etant donné l'opération a duré 10 jours, un seul passage de contrôle a été nécessaire. Le deuxième passage a coïncidé avec le retrait des appareils. Avant toute pose, l'opérateur s'est assuré que le champ de vision de la caméra n'est pas trop encombré pour limiter la prise tout azimut des images inutiles. Lors de la visite de contrôle, la caméra est repositionnée lorsqu'on estime que l'emplacement n'a pas permis d'atteindre les objectifs fixé (capter des animaux). A cet effet, trois caméras (AC1, LEA2S4, LEA2B14) initialement placées respectivement dans un champ de maïs, jachère et forêt dense dégradée ont été déplacé après 5 jours et repositionnés dans la forêt dense sacrée pour optimiser les observations.





(Source : Antea, juillet 2020)

Figure 6 : Pose de caméra piège dans une plantation d'*Acacia auriculiformis* (à gauche) et dans la forêt sacrée (à droite)

Tableau 2 : Coordonnées géographiques des points de pose des caméras

Code des caméras	Latitude	Longitude	Habitats
B002	6,609636	2,256281	Friche
LEA2B10	6,588892	2,254191	Plantation acacia
LEA2B14	6,563891	2,231929	Jachère
AC1	6,577083	2,23482	Champ de maïs
LEA2S4	6,577224	2,234885	Jachère
AC2	6,596189	2,259149	Forêt sacrée
B001	6,59616	2,25915	Forêt sacrée
C4	6,597366	2,258111	Forêt sacrée
AC3	6,597191	2,259953	Forêt sacrée
A8	6,596519	2,259842	Forêt sacrée
AC1	6,597211	2,259589	Forêt sacrée
LEA2S4	6,59611	2,259456	Forêt sacrée
LEA2B14	6,597211	2,259027	Forêt sacrée

Concernant les pièges pour capture, ils ont été appâtés avec un épis de maïs pour attirer les animaux qui sont à la quête de nourriture. Une fois appâtés, ils ont été placés dans un milieu, où ils y sont restés actifs pendant 20 jours. Ils ont été relevés tous les matins aux environs de 7h30 puis refermés pour la journée et n'ont été rouverts qu'aux environs de 18h30. Ne piéger que de 18h30 à 7h30 permet d'augmenter les chances de captures des micromammifères, nocturnes pour la plupart. Après 10 jours dans le milieu de départ, les pièges ont été déplacé vers d'autre points dans le but de maximiser les chances de capture. Au total les pièges ont été placés au niveau de 20 points sur le site du projet. Le tableau 3 présente les coordonnées géographiques des points de pose des pièges. Ces points ont été représentés sur la figure 7.

Tableau 3 : Coordonnées géographiques des points de pose des pièges



Code des pièges	Latitude	Longitude	Habitats
P1	6,579583	2,231228	Plantation
P2	6,576793	2,218405	Champs
P3	6,573555	2,22252	Plantation
P4	6,575162	2,221872	Champs
P5	6,594258	2,256652	Champs
P6	6,593662	2,256503	Champs
P7	6,59321	2,255927	champs
P8	6,591852	2,239392	Champs
P9	6,585352	2,232852	Champs
P10	6,584473	2,237587	Champs
P1	6,571962	2,243708	Champs
P2	6,565655	2,241363	plantation
P3	6,572562	2,249643	champs
P4	6,577203	2,253242	Plantation
P5	6,586643	2,242722	Plantation
P6	6,579992	2,239028	Plantation
P7	6,591265	2,2443	Plantation
P8	6,60397	2,25178	Champs
P9	6,573223	2,246617	Champs
P10	6,574608	2,227755	Plantation

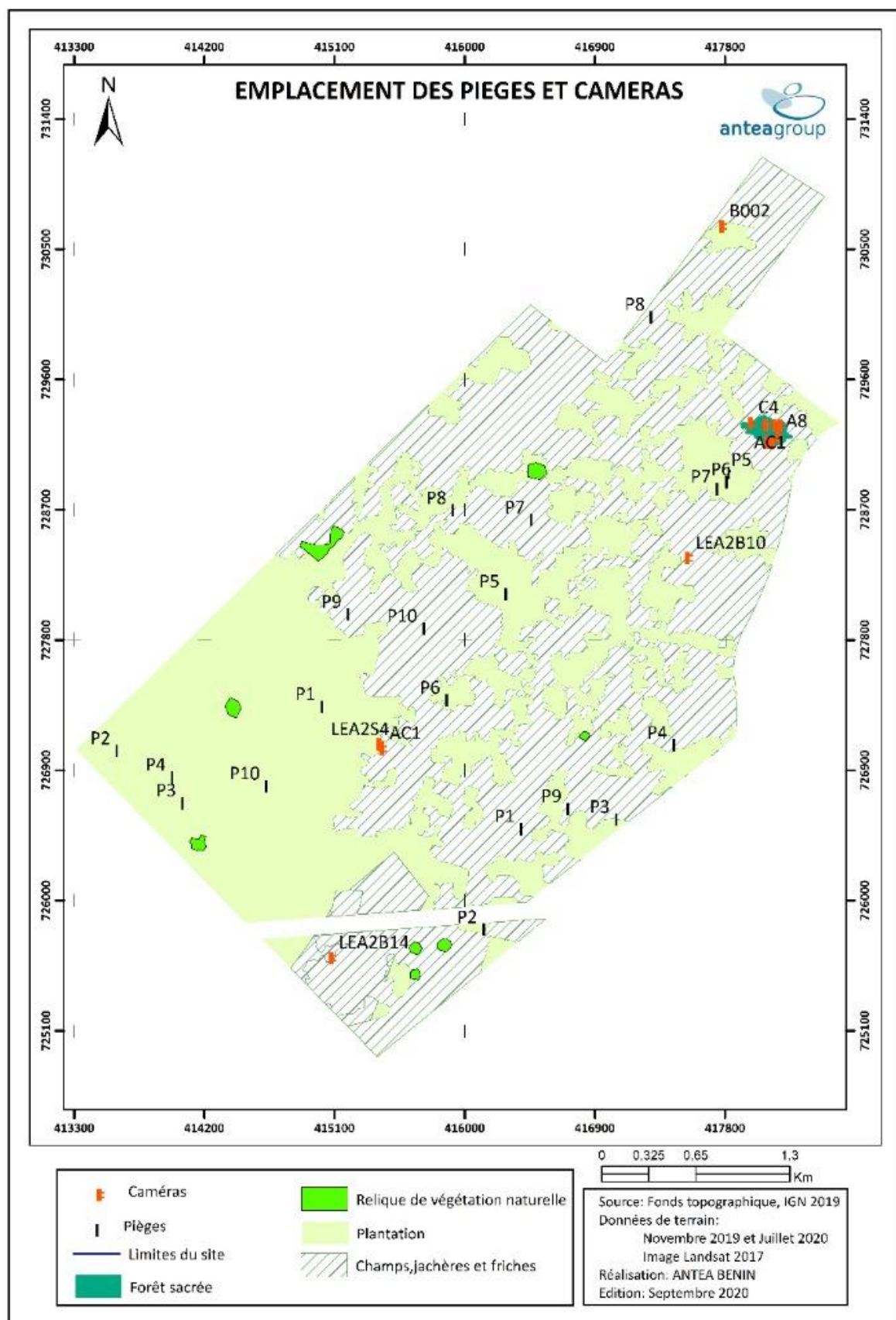


Figure 7 : Carte montrant les emplacements des caméras et des pièges sur le site du projet

### 2.3.2.4. Surveillance des caméras et pièges

Vu le degré d'anthropisation du site, un dispositif de surveillance des pièges a été nécessaire pour la conduite des travaux. Ainsi, pour la sécurité des matériels (caméras et pièges) des chasseurs ont été identifiés au niveau des huit (08) villages affectés par le projet et une séance d'information et de cadrage a été faite avec ces derniers (figure 8). Au total 10 chasseurs ont été identifiés et mis à contribution pour la surveillance des caméras et des pièges.

L'implication des chasseurs a permis de maximiser les chances de captures et de palier à des conflits entre équipe de terrain et riverains et par-dessus tout, limiter les cas de vols des installations dans le cadre de l'étude.



(Source : Antea, juillet 2020)

Figure 8 : Séance d'information et de cadrage avec les chasseurs de la zone du projet

### 2.3.2.5. Données collectées

Lors de chaque visite (ici tous les 5 jours), l'opérateur s'assure que les caméras fonctionnent en se faisant prendre une photo. Ensuite vérifie le niveau de la batterie pour s'assurer qu'il y a encore une autonomie. La donnée principale a été de copier toutes les photos prises par la caméra et si celle-ci était pleine, supprimer-les afin de permettre à la caméra d'opérer les jours suivants.

Pour les pièges, les données collectées ont été l'identification de l'animal pris au piège, la date, et la prise de photo avant relâchement de l'animal.

### 2.3.2.6. Identification des espèces

Avec le guide d'identification des mammifères de l'Afrique de l'Ouest et la base photo faune mammifère de CREDI-ONG, toutes photos d'espèce prise par les caméras ont été identifiées.

### 2.3.2.7. Traitement des données

Les photos ont été organisées par caméra piège. L'ensemble des photos a été observé pour en extraire les bonnes (photo d'espèce animal) puis les identifier. Avec un tableur Excel il a été inscrit le nom scientifique de l'espèce, le nom courant (s'il existe), la date de capture de l'image, le degré de présence (ici lié au nombre d'image de l'espèce prise par rapport au nombre caméra), l'habitat, la dynamique (jeune, subadulte, adulte), sexe (si observable) et activités (si possible).

## 2.4. Calendrier de réalisation des activités

L'ensemble des activités mentionnées ci-dessus (inventaire flore, inventaire mammifères et inventaire faune aviaire) a été réalisé aux jours et heures consignés dans le tableau 2.

Tableau 4 : Dates et heures de réalisation des activités

Type de collecte	Dates (JJ/M/AAAA)	Heures
Inventaire flore	17/07/2020	07h 30' à 16h
	18/07/2020	07h 12' à 16h 05'
	19/07/2020	07h 22' à 16h 10'
	20/07/2020	07h31' à 16h 15'
	21/07/2020	07h 03' à 16h 22'
	22/07/2020	07h 05' à 15h 11'
Inventaire de la faune aviaire	23/07/2020	07h13' à 11h43'
	24/07/2020	15h12' à 17h 42'
	25/07/2020	07h30' à 11h45'
	26/07/2020	07h22' à 10h44'
	27/07/2020	15h14' à 18h10'
	28/07/2020	07h13' à 10h39'
	29/07/2020	07h 19' à 10h 20'
	30/07/2020	15h à 18h 28'
	30/07/2020	21h21' à 23h24'
	31/07/2020	23h20' à 4h 11'
Inventaire mammifères (Caméras pièges)	24/07/2020 au 03/08/2020	24h/24h
Inventaire mammifères (Pièges non vulnérant)	24/07/2020 au 13/08/2020	24h/24h

Source : Antea, juillet – Août 2020

### 3. Résultats

#### 3.1. Description des habitats de la zone du projet

Le couvert végétal du site est caractérisé par des mosaïques de cultures, de jachères, de friches. A tout ceci s'ajoute quelques reliques de végétation naturelle à dominance *d'Albizia spp.* et *Dialium guineense*. On note également la présence de quelques plantations. Il s'agit des plantations de palmiers, de tecks de gmelina, d'acacia, d'eucalyptus, d'orangers et de papayers. Ces différentes formations végétales peuvent être regroupées en deux grands types d'habitats à savoir : habitat naturel et habitat modifié (tableau 5). Selon la norme de performance 6 de l'IFC (International Finance Corporation), les habitats naturels sont composés d'assemblages viables d'espèces végétales et/ou animales qui sont en grande partie indigènes et/ou dont les fonctions écologiques primaires et les compositions d'espèces n'ont pas fondamentalement été modifiées par l'activité humaine. Cette même norme définit les habitats modifiés comme étant les aires aménagées pour l'agriculture, les plantations forestières, les zones côtières récupérées à la mer et les aires récupérées aux marécages ». Aucun habitat critique<sup>1</sup> n'a été observé sur le site.

Tableau 5: Types d'habitats dans la zone du projet

Types d'habitats	Composantes
Habitat naturel	Forêt dense
Habitat modifié	Espaces agricoles, jachères, friche, forêt dégradée et plantations

Source : Antea, juillet – Août 2020

Le tableau 6 présente les surfaces des habitats présents sur le site du projet

Tableau 6 : Type d'habitat et surface correspondante

Types d'habitats	Surface de l'habitat / % de la surface de la zone d'étude
Forêt sacrée	4,37 ha, soit 0,29 %
Relique de végétation naturelle	7,33 ha, soit 0,50 %
Plantations	677,29 ha, soit 46,16 %
Champs_jachères_friches	762,01 ha, 51,94 %
Pistes agricoles_surfaces de sol nu_infrastructures	16 ha, soit 1,09%

Source : Antea, juillet 2020

<sup>1</sup> Les habitats critiques sont des aires ayant une valeur élevée en biodiversité, notamment (i) les habitats d'une importance cruciale pour les espèces en danger critique d'extinction et/ou en danger d'extinction<sup>11</sup>; (ii) les aires d'une grande importance pour les espèces endémiques et/ou distribution limitée; (iii) les aires d'une grande importance abritant des concentrations internationales importantes d'espèces migratoires et/ou d'espèces uniques; (iv) les écosystèmes gravement menacés et/ou uniques; et (v) les aires qui sont associées à des processus évolutifs clés.



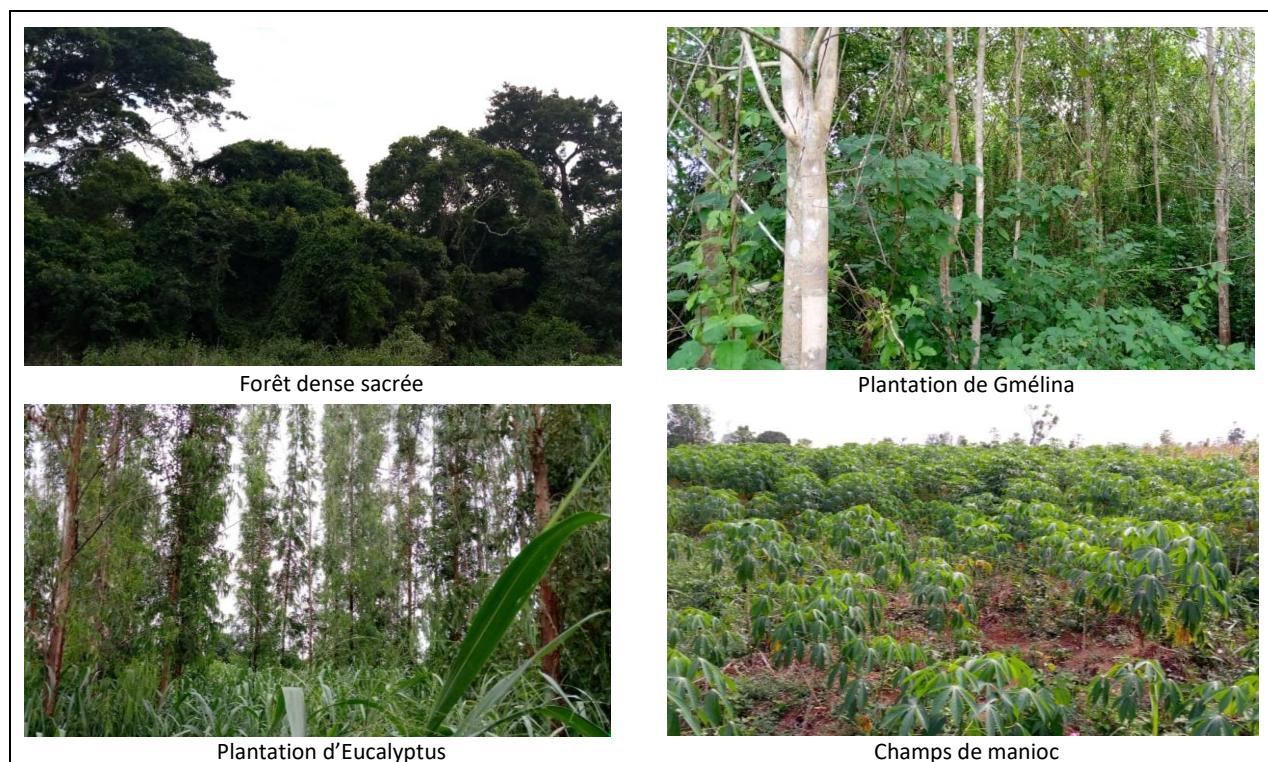


Figure 9 : Types d'habitats sur le site du projet



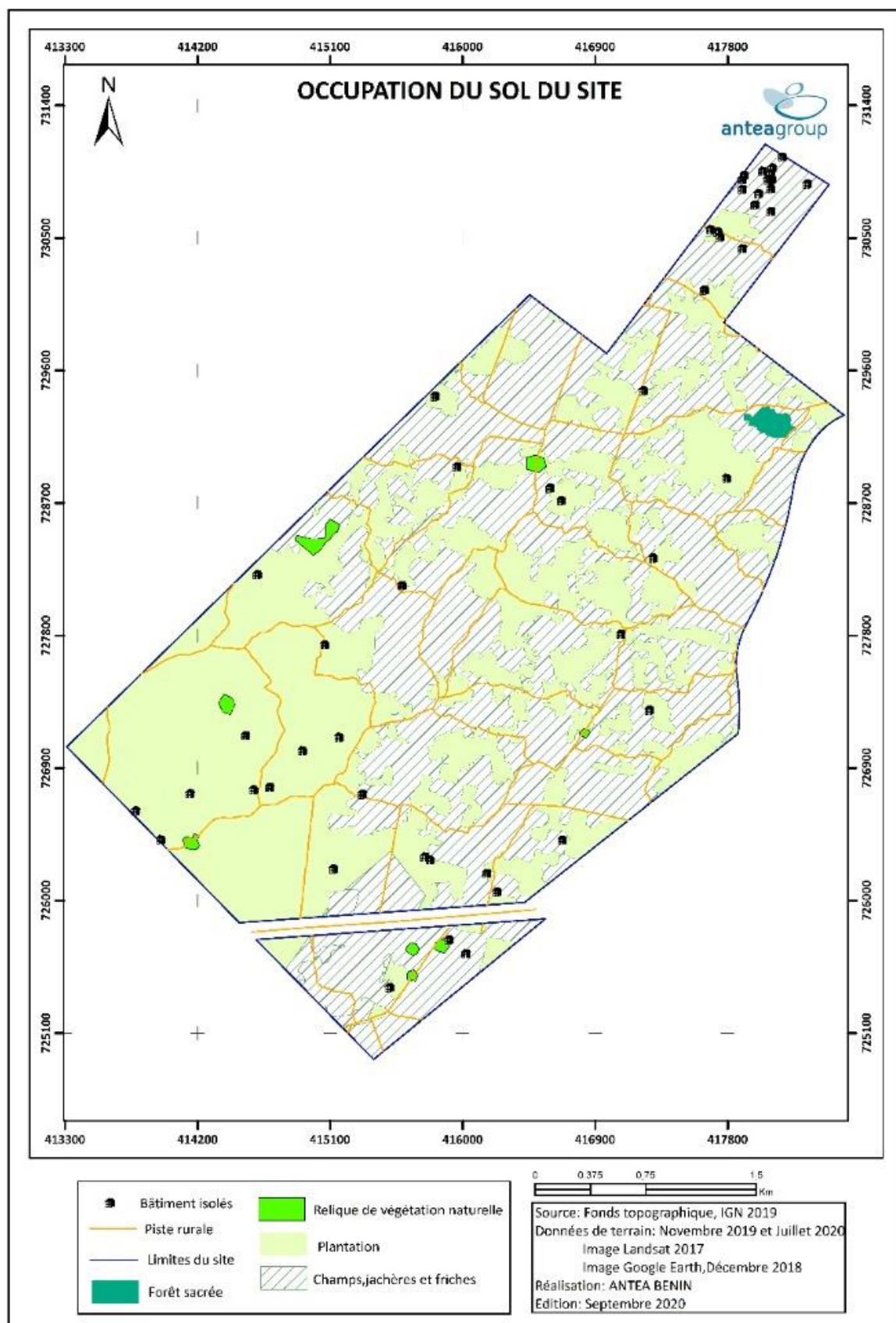


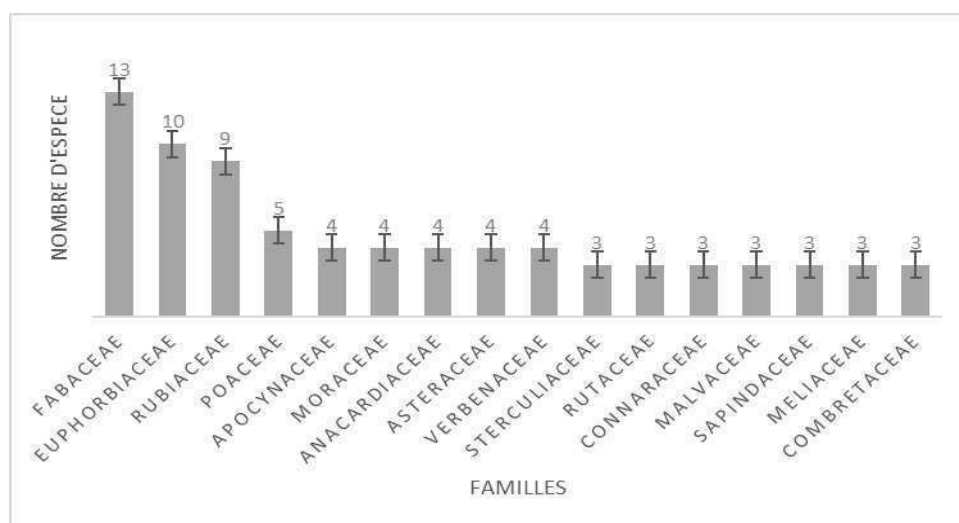
Figure 10 : Occupation du sol sur le site du projet

## 3.2. Flore et végétation (Aspect floristique du site)

### 3.2.1. Richesse floristique

Les différentes prospections réalisées dans le cadre de l'étude sur la biodiversité et saisonnalité ont abouti à une matrice globale de 124 espèces. Elles se répartissent en 113 genres et 55 familles. La richesse spécifique varie en moyenne entre 16 et 47 espèces par placeau de 900 m<sup>2</sup>.

Les 16 familles les mieux représentées (comportant au moins 3 espèces) de la florule inventoriée sont reprises dans la figure ci-après. Elles totalisent à elles seules 78 espèces, soit 62,90 % du total floristique.



(Source : Antea, juillet 2020)

Figure 11 : Diversité spécifique des 16 principales familles des espèces végétales sur le site

L'analyse de la figure montre que les familles des Fabaceae, des Euphorbiaceae et des Rubiaceae sont mieux représentées dans la végétation. La végétation pourrait donc présenter une physionomie forestière dans le futur car c'est parmi celles-ci que se recrutent les ligneux qui impriment une physionomie forestière à la végétation (Miabangana & Ayingweu, 2015).

La richesse spécifique obtenue au niveau de la forêt de Anavié est de 45 espèces réparties en 44 genres et 30 familles. Le calcul des paramètres de biodiversité permettra d'apprécier la diversité au niveau des formations végétales.

## 3.3. Aspect physionomique de la végétation

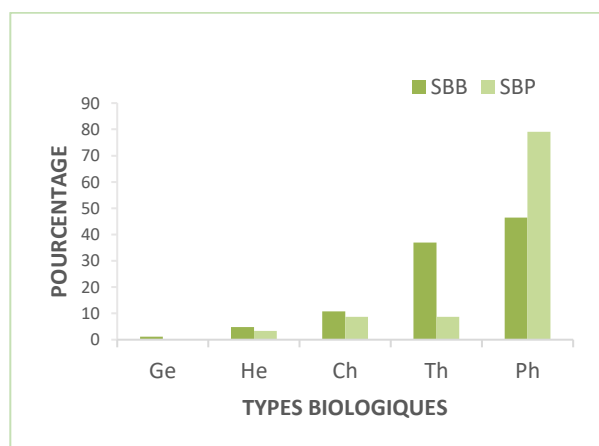
### 3.3.1. Les types biologiques

L'examen des types biologiques permet de déterminer les stratégies adaptatives ainsi que la physionomie de la végétation. Nous avons adopté les types biologiques définis d'après la classification de RAUNKIAER (1934) modifiée par LEBRUN (1947) : Phanérophytes (Ph) : arbres, arbustes et arbrisseaux, lianes ; Chaméphytes (Ch) : sous-arbrisseaux ; Hémicryptophytes (He) : herbacées pérennes ; Géophytes (Ge) : plantes à tubercules, rhizomes ou bulbes

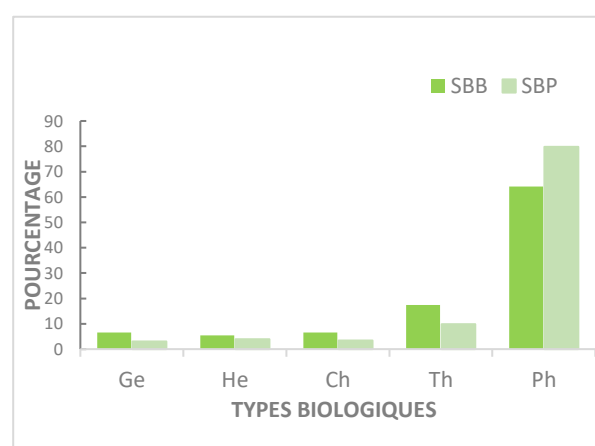
(disparaissent sous terre pendant la mauvaise saison) ; Thérophytes (Th) : plantes annuelles (ne subsistant que sous forme de graines). Sur la base des différents types biologiques des espèces inventoriées, les spectres biologiques ont été représentés.

Le spectre biologique représente pour un groupement végétal donné la proportion des espèces suivant leurs formes biologiques : les phanérophytes ; les chaméphytes ; les hémicryptophytes ; les géophytes et le thérophytes.

On distingue les spectres bruts (fréquence de notation des plantes appartenant à différentes formes biologiques) et les spectres pondérés (représentent le recouvrement de chaque forme biologique).



Source : (Antea, novembre-décembre 2019)



Source : (Antea, juillet 2020)

**SBB : Spectre Biologique Brut ; SBP : Spectre Biologique Pondéré**

**Figure 12 : Spectres bruts et pondérés des Types Biologiques suivant les saisons (saison sèche à gauche et saison pluvieuse à droite)**

L'analyse quantitative des spectres des types biologiques (figure 11), indique que les Phanérophytes sont les formes de vie les plus abondantes quel que soit la saison (46,42 % en saison sèche et 64,13 % en saison pluvieuse) et les plus dominantes (79,05 % en saison sèche et 79,80 % en saison pluvieuse). Elles sont suivies des Thérophytes (spectre brut : 36,90 % et 17,39 % et spectre pondéré : 8,74 % et 9,85 %). L'importance des Chaméphytes, des Hémicryptophytes, et des Géophytes demeure faible quel que soit la saison. Toutefois les Géophytes, présentent une abondance-dominance plus élevée en saison pluvieuse (spectre brut : 6,52 % et spectre pondéré : 3,04 %) comparée à celle en saison sèche (spectre brut : 1,19 % et spectre pondéré : 0,21 %). Ceci confirme leur disparition sous terre pendant la saison sèche et leur apparition pendant la saison de pluie. Les placeaux (R5 et R8) au niveau desquels les thérophytes étaient beaucoup plus observés en novembre 2019 ont été retrouvés convertis en terrains agricoles et donc n'ont plus fait objet d'étude. Ce qui a conduit à observer une diminution du taux des thérophytes en juillet 2020 (saison pluie) comparé à celui de novembre 2019.

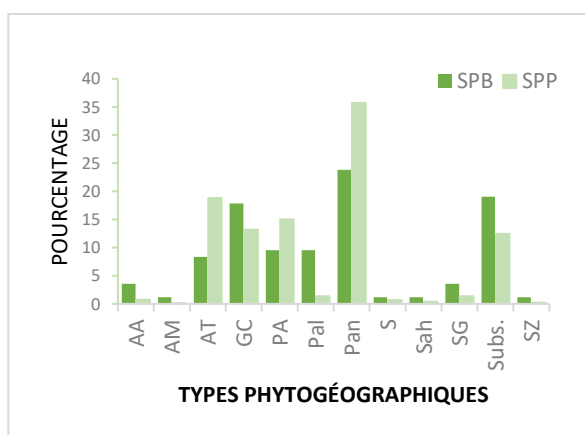


(Source : Antea, juillet-août 2020)

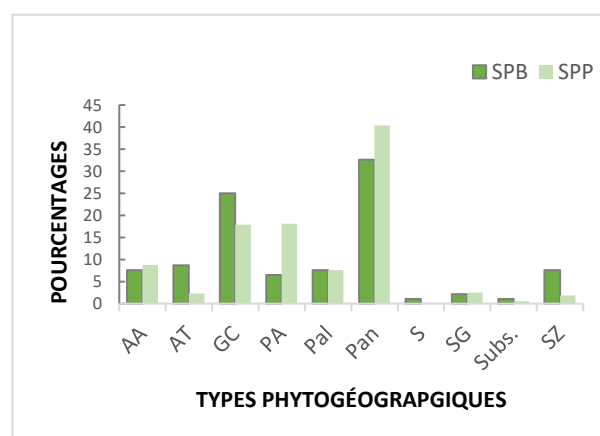
Figure 13 : Photographie des points de relevés de novembre 2019 retrouvés sans végétation sur le site

## 3.3.2. Les types phytogéographiques

En se référant aux subdivisions phytochorologiques de l'Afrique Centrale, telles que proposées par WHITE (1979,1986), les espèces ont été réparties par leurs affinités biogéographiques. La figure 12 présente les spectres bruts et pondérés des types phytogéographiques des formations végétales étudiées selon les saisons.



(Source : Antea, novembre-décembre 2019)



(Source : Antea, juillet 2020)

**Légende :** AA = Afro-américaines ; AM = Afro-Malgaches ; AT = Afro-tropicales ; GC = Guinéo-congolaises ; PA = Plurirégionales africaines ; Pal = Paléotropicales ; Pan = Pantropicales ; S = Espèces de l'élément base soudanien ; Sah= Sahélienne ; SG = Soudano-Guinéennes ; Subs. = Subsaharienne ; SZ = Soudano-zambéziennes.

Figure 14 : Spectres des Types Phytogéographiques Biologiques suivant les saisons (saison sèche à gauche et saison pluvieuse à droite)

L'analyse des spectres des types phytogéographiques montre que sur le plan chorologique, les espèces pantropicales (Pan) sont les types phytogéographiques les plus abondants et dominants quel que soit la saison. Cette prépondérance des espèces pantropicales (Pan) qui sont des espèces à large distribution géographique confirme la perturbation de la flore locale. La végétation naturelle n'a donc plus ses spécificités phytogéographiques (faible abondance-dominance des espèces de chorologie GC : guinéo congolaise) à la suite de sa dégradation.

### 3.4. Caractérisation des formations végétales

#### 3.4.1. Paramètre de biodiversité

Les paramètres de biodiversité des différentes formations végétales (forêt sacrée et milieu anthropisé) sont présentés dans le tableau 1.

Tableau 7 : paramètres de biodiversité au niveau des formations végétales du site

Paramètre de biodiversité	Forêt sacrée	Milieu anthropisé
R	45 ± 4	92 ± 31
H	3,51 ± 0,1	4,94 ± 0,07
E	0,64 ± 0,01	0,76 ± 0,01
D	0,16 ± 0,01	0,05 ± 0,002
1/D	6,25	20

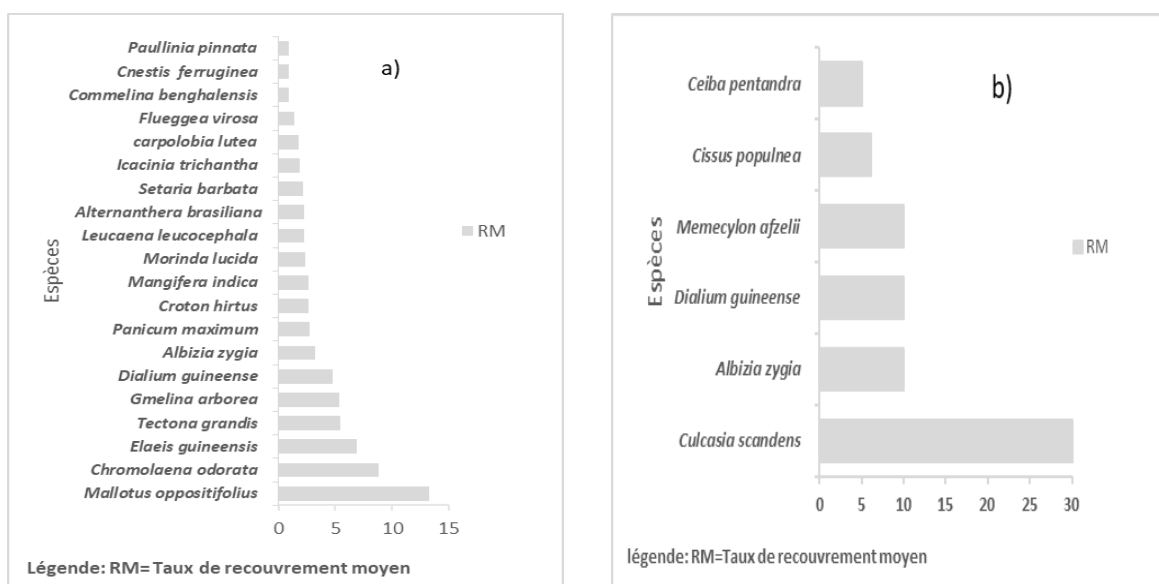
**Légende :** R : richesse spécifique ; H : indice de diversité de Shannon ; E : Indice d'équitabilité de piélou ; D : Indice de dominance de Simpson ; 1/D : Diversité de simpson

(Source : données de terrain, juillet 2020)

L'observation du tableau 1 indique que la richesse spécifique est de 92 pour l'ensemble des placeaux installés dans les formations anthropisées (hors forêt Anavié) et de 45 au niveau de l'ensemble des placeaux de la forêt de Anavié. L'indice de diversité de Shannon varie entre 3,51 bits et 4,94 bits. Ce qui signifie que la forêt a une diversité moyenne ( $0 < H < 4$ ) et les milieux anthropisés présentent une diversité élevée ( $H > 4$ ). Cette diversité pourrait s'expliquer par l'absence de grands arbres. Cette absence favorise la pénétration de la lumière dans les formations et donc le développement d'un grand nombre d'espèce y compris les espèces envahissantes.

L'indice d'équitabilité de Pielou est de 0,64 au niveau de la forêt et de 0,76 dans les formations anthropisées. Il ressort donc l'existence d'une équitable moyenne en terme d'abondance et dominance des espèces tant aussi bien dans les formations anthropisées que dans la forêt d'Anavié. Les valeurs de l'indice de dominance de Simpson montrent que même s'il y a une équitabilité moyenne on note une légère dominance par certaines espèces. L'indice de diversité confirme qu'au niveau de la forêt 6 espèces sur 45 viennent en tête contre 20 espèces sur 92 au niveau des formations anthropisées. Ces différentes espèces avec les taux de recouvrement correspondants ont été repris dans la figure ci-dessous.





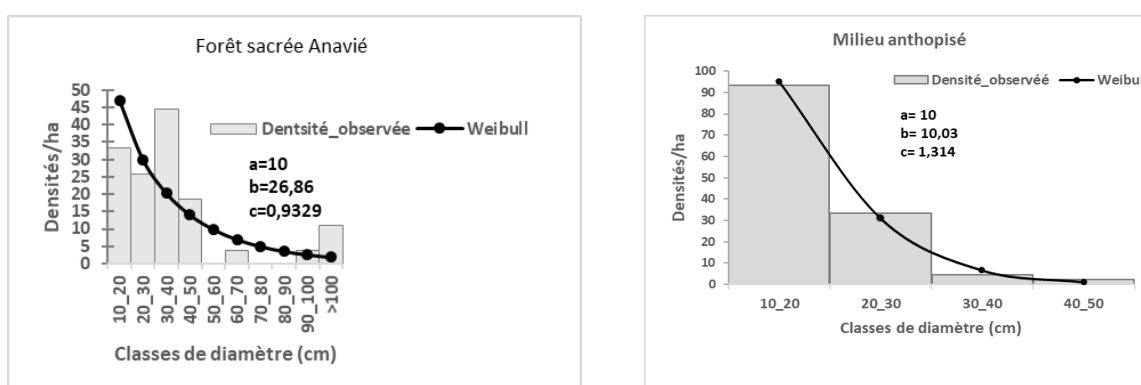
(Source : Antea, juillet 2020)

**Figure 15 : Structure de la dominance des espèces en fonction du taux de recouvrement (a=milieu anthropisé ; b= forêt sacrée d'Anavié)**

Globalement il ressort que le site outre d'être un milieu isotrope (favorable à plusieurs espèces) est loin d'être un milieu spécialisé (favorable à très peu d'espèce). La diversité observée témoigne donc des réalités existantes dans le milieu (l'influence de la pression humaine).

## 3.4.2. Structuration en classes de diamètre des arbres

Pour apprécier la structuration des formations végétales, les arbres dont le dbh  $\geq 10$  cm ont été considéré. Vu que ces arbres sont en faible nombre au niveau des placeaux installés en dehors de la forêt sacrée, un regroupement prenant en compte tous les arbres dont le dbh  $\geq 10$  cm a été fait pour apprécier de manière globale la structuration. Les structures par classes de diamètre des formations végétales ayant fait objet de relevé sont présentées par la figure ci-dessous. Ces structures présentent toutes deux une distribution asymétrique positive ou asymétrique droite caractéristique des peuplements monospécifiques avec prédominance d'individus jeunes ou de faibles diamètre.



(Source : Antea, juillet 2020)

**Figure 16 : Structure en classes de diamètre des formations végétales ayant fait objet de relevé sur le site du projet**



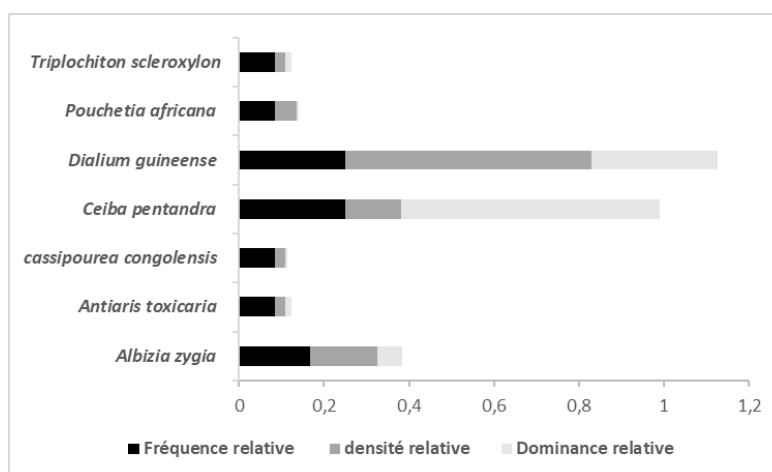
L'examen de la figure 14 montre que le paramètre de forme  $c$  (0,9329) a une valeur inférieure à 1 au niveau de la forêt de Anavié. Les individus (toutes espèces confondues) de diamètre compris entre 30 cm et 40 cm sont plus observé avec 45 arbres à l'hectare. Il est noté une absence d'individu dans les classes de diamètre compris entre 70 cm et 90 cm. Cette absence explique un déséquilibre au niveau de la stabilité de la forêt. Si cette forêt doit être maintenue il faudra suivre l'évolution des actuels jeunes arbres pour combler ce vide et en même temps mettre en terre de jeunes plants pour assurer l'équilibre écologique au niveau de la forêt.

Par ailleurs, la distribution constatée pour les arbres des placeaux hors de la forêt présentent une asymétrie droite ( $1 < c < 3,6$ ), caractéristique des peuplements artificiels. Il en ressort une prépondérance des individus (toutes espèces confondues) jeunes de petites circonférences (10 à 20 cm). Cette prépondérance pourrait s'expliquer par les défrichements aux fins agricoles au cours desquels on assiste à l'abattage systématique des arbres à grandes circonférences sur de très grande superficie destinée aux cultures héliophiles comme l'ananas.

### 3.4.3. Structure de la dominance des arbres de la forêt d'Anavié

L'indice de valeur d'importance (IVI), détermine l'importance d'une espèce dans un relevé. Cet indice a été utilisé dans le cas présent pour catégoriser les arbres selon leur importance en terme de fréquence, densité et de dominance.

La figure ci-dessous présente la structure de dominance des arbres dans la forêt sacrée de Anavié.



(Source : Données de terrain juillet 2020, Antea)

Figure 17 : Indices des Valeurs d'importance des espèces ligneuses de la forêt de Anavié

L'analyse de la figure 16 montre que *Dialium guineense* et *Ceiba pentandra* possèdent l'IVI les plus élevés. Soient respectivement 1,12 et 0,99. Ces valeurs témoignent que ces espèces tiennent le premier rang selon les critères de fréquence, de densité et de dominance au niveau de la forêt de Anavié.

### 3.4.4. Estimation du volume de bois disponible dans la forêt sacrée de Anavié

Le volume de bois (toutes espèces confondues) au niveau de la forêt a été évalué afin d'avoir une idée de la ressource disponible. Le tableau ci-après rend compte du volume de bois disponible dans la forêt.

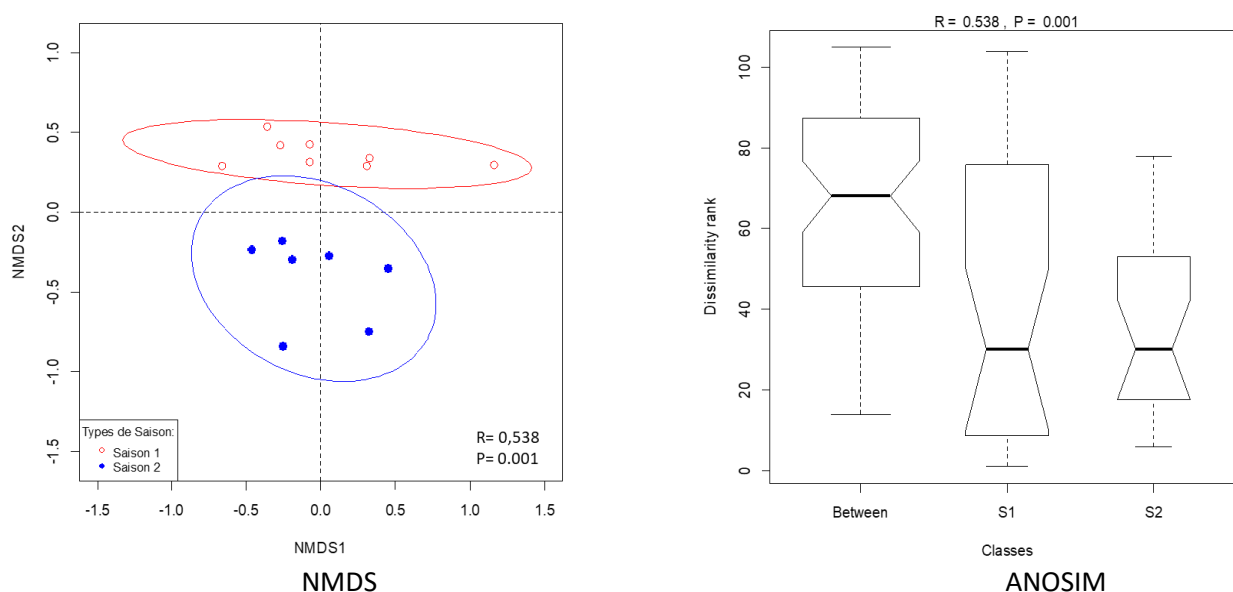
Tableau 8 : Estimation du volume de bois disponible dans la forêt sacrée d'Anavié

Volume fût (m <sup>3</sup> )	Volume totale (m <sup>3</sup> )	Volume bois énergie (m <sup>3</sup> )
4322,46	16009,11	11686,65

(Source : Antea, juillet 2020)

### 3.5. Comparaison de la composition floristique en fonction des saisons

Pour comparer les compositions floristiques des relevés réalisés en novembre 2019 et en juillet 2020, l'indice de similarité de Jaccard a été calculé. La valeur de cet indice est  $ISJ = 0,35$ . Ce qui montre qu'il y a une faible similarité au niveau de la composition floristique en fonction des saisons. Les analyses de NMDS et ANOSIM ont permis d'apprécier le niveau de dissimilarité en fonction des saisons. Les résultats sont présentés par les figures ci-dessous.



Légende : Saison 1 = Novembre 2019 ; Saison 2 = Juillet 2020

(Source : Antea, novembre 2019 et juillet 2020)

Figure 18 : Composition floristique du site suivant les deux saisons (ANOSIM, NMDS)

Le positionnement multidimensionnel de la composition floristique (toutes catégories confondues : herbacée, ligneux, régénération) des deux saisons révèle deux (02) groupes floristiques. La probabilité associée aux résultats de NMDS est  $P = 0.152$  (valeur de stress). Il ressort donc que les compositions floristiques des deux groupes sont statistiquement différentes l'un de l'autre, quoique partageant certaines espèces.

Les résultats de l'ANOSIM montrent qu'au niveau d'un même point de relevé, le niveau de dissimilarité de biodiversité entre les deux saisons est faible (environ 35%). Mais lorsqu'on

considère l'ensemble des relevés des deux saisons le niveau de dissemblance avoisine soixante-dix pourcent (70%). Ce qui confirme que la dissimilarité entre les deux saisons est hautement significative ( $R=0,538$ ;  $P=0,001$ ). Il ressort alors que la biodiversité du site connaît une variation que l'on soit en saison sèche ou en saison pluvieuse. Cette diversité est plus forte en saison pluvieuse qu'en saison sèche (104 en saison sèche contre 124 en saison pluvieuse).

### 3.6. Espèces de flore nécessitant une attention particulière

Au nombre des espèces rencontrées sur le site, très peu sont des espèces à statut particulier. Aucune espèce recensée n'est endémique de la zone du site du projet. Les quelques espèces qui font objet de protection et nécessitant une attention particulière se résument dans le tableau ci-après.

Tableau 9 : Espèces de flore nécessitant une attention particulière

Espèces à statut particulier	Noms communs	Statut liste rouge Bénin	Statut réglementation nationale	Statut UICN
<i>Milicia excelsa</i>	Iroko	EN	P	Vu
<i>Pouteria alnifolia</i>	-	NE	P	Vu
<i>Rauvolfia vomitoria</i>	Poison devil's pepper	NT	P	LC
<i>Khaya senegalensis</i>	Caïlcédrat	EN	P	Vu
<i>Triplochiton scleroxylon</i>	Samba	EN	P	LC
<i>Zanthoxylum zanthoxyloides</i>	Fagara jaune	Vu	P	LC
<i>Albizia spp.</i>	Albizia	LC	P	LC
<i>Dialium guineense</i>	Tamarinier noir	LC	P	LC
<i>Antiaris toxicaria</i>	Antiaris	LC	P	LC
<i>Ceiba pentandra</i>	Fromager	LC	P	LC
<i>Blighia sapida</i>	Akée	LC	P	LC
<i>Spondias mombin</i>	Prunier monbin	LC	P	LC

(EN) En danger, (VU) Vulnérable, (LC) Préoccupation mineure, (NT) Quasi menacé, (P) Protégée selon la réglementation nationale

(Source : Antea, juillet-août 2020)



*Pouteria alnifolia*



*Ceiba pentadra*



*Triplochiton scleroxylon*



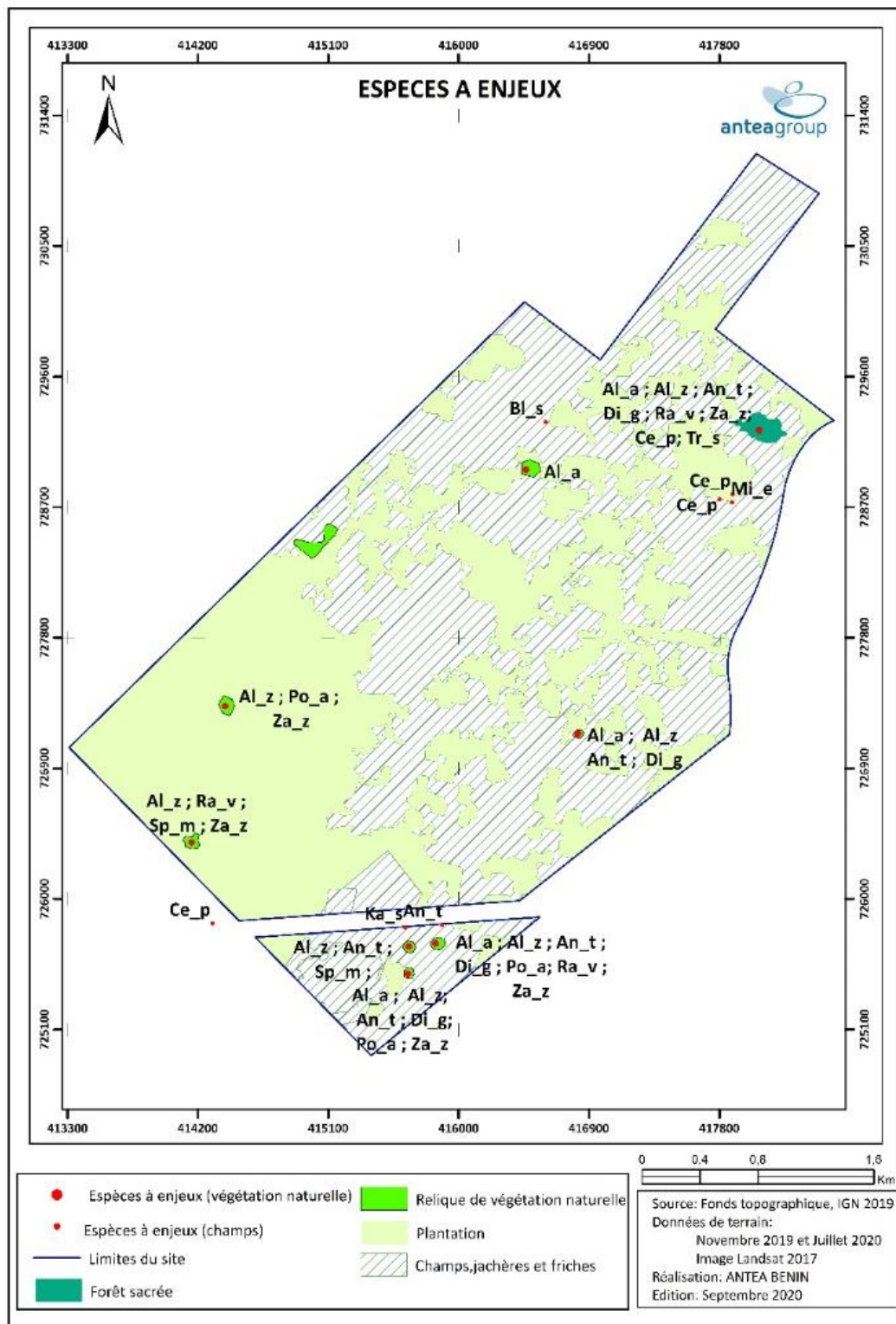
*Milicia excelsa*

(Source : Antea, juillet-août 2020)

Figure 19 : Espèces à statut particulier



La figure ci –après montre la distribution de ces différentes espèces à enjeux sur le site.



**Ka\_s** : *Khaya senegalensis* ; **Al\_a** : *Albizia adianthifolia* ; **Al\_z** : *Albizia zygia* ; **An\_t** : *Antiaris toxicaria* ; **Bl\_s** : *Blighia sapida* ; **Ce\_p** : *Ceiba pentadra* ; **Di\_g** : *Dialium guineense* ; **Mi\_e** : *Milicia excelsa* ; **Po\_a** : *Pouteria alnifolia* ; **Ra\_v** : *Rauvolfia vomitoria* ; **Sp\_m** : *Spondias mombin* ; **Tr\_s** : *Triplochiton scleroxylon* ; **Za\_z** : *Zanthoxylum zanthoxyloides*

Figure 20 : Carte montrant la distribution des espèces à enjeux sur le site du projet

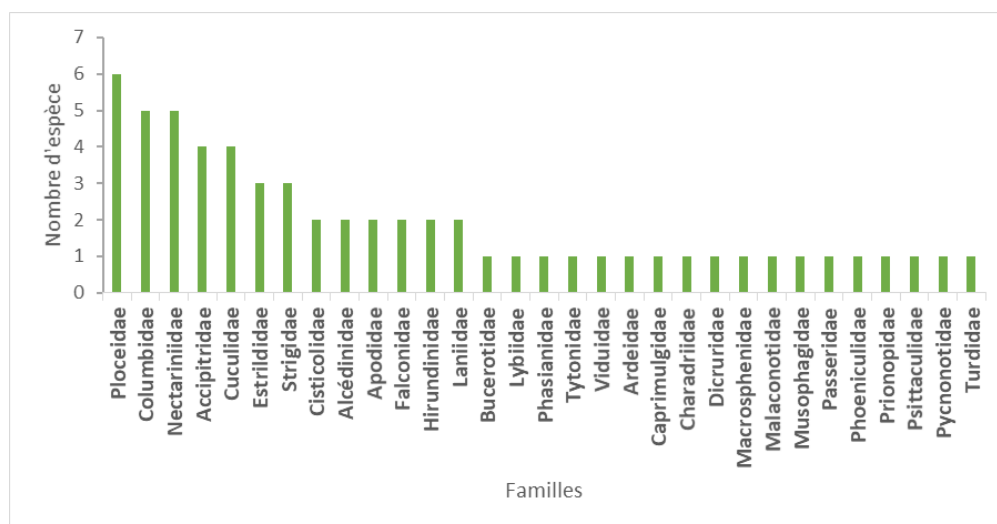
### 3.7. Faune aviaire

#### 3.7.1. Richesse spécifique et abondance

Les différentes prospections réalisées dans le cadre de l'étude sur la biodiversité et saisonnalité ont abouti à une matrice globale de soixante 60 espèces d'oiseaux. Elles se répartissent en trente-et-un (31) familles et seize (16) ordres. Cet effectif représente 10,17 % de l'effectif total des oiseaux du Bénin (Dowsett-Lemaire & Dowsett., 2019).

Pour une superficie de 1467,69 ha avec le nombre de transect parcouru, cet effectif reste un peu faible. La liste exhaustive des espèces d'oiseaux inventoriées est consignée dans le tableau présenté en annexe 2.a du rapport.

Les Passeriformes (les passereaux sont qualifiés d'oiseaux chanteurs, et possèdent des muscles complexes pour contrôler leur syrinx, qui est un organe situé au fond de la trachée permettant d'émettre des vocalises) regroupent 29 espèces de 15 familles et représentent 48,33% de l'effectif total. Les Non-passeriformes (les autres ordres) renferment 31 espèces appartenant à 16 familles. Ceux-ci représentent 51,67% de l'effectif total. La figure suivante présente la diversité spécifique des familles des espèces d'oiseaux sur le site.



(Source : Antea, juillet 2020)

Figure 21 : Diversité spécifique des familles des espèces d'oiseau sur le site

L'analyse de la figure 21 révèle que les familles qui ont les richesses spécifiques les plus importantes sont celles des :

- Ploceidae qui regroupe 06 espèces ;
- Columbidae qui regroupe 05 espèces ;
- Nectariniidae qui regroupe 05 espèces.

Toutes les espèces observées sont sédentaires. Aucune espèce migratrice n'a été rencontrée. En effet, la période de la réalisation de l'étude ne coïncide pas avec l'arrivée des espèces migratrices (à partir de mi-septembre), d'où cette absence totale remarquée.

Ces résultats montrent que la majorité des espèces observées sur le site sont des espèces communes (c'est-à-dire des espèces qui sont souvent rencontrées dans les études de faune



aviaire au Bénin). Elles sont toujours rencontrées dans leur biotope tant solitaire ou en grand nombre.

Les espèces observées sur le site sont pour la plupart celles rencontrées généralement dans des milieux dégradés ou anthropisés (les champs, les plantations, les zones urbaines) et ne présentent pas de grand enjeux de conservation.

Nicholson, (1951) a distingué plusieurs catégories d'oiseau selon les milieux. Il s'agit des oiseaux : i) des villes et des fermes ; ii) des campagnes ; iii) des jardins, vergers et des haies ; iv) des villes et bâtiments. L'auteur a également détaillé l'écologie des espèces en fonction des différents milieux anthropisés qu'elles occupent et a également insisté sur les variations intraspécifiques de la proximité aux humains. C'est l'un des premiers auteurs à établir une liste des oiseaux vivant au contact des humains en fonction des milieux qu'ils utilisent et des régions où ils vivent. Ainsi, la plupart des espèces observées sur le site et réparties dans ces différents ordres et familles témoignent que la zone est fortement anthropisée. Quelques espèces spécialistes des milieux forestiers sont observées grâce à la présence d'îlot forestier et jachères sur le site. C'est le cas du Souimanga superbe (*Cinnyris superbus*), de la Tourterelle tambourette (*Turtur tympanistria*).

Par ailleurs, une espèce inféodée aux zones humides est observée sur le site. Il s'agit du Vanneau terne (*Vanellus lugubris*) qui fréquente également les zones sèches (prairie, champs dégagé) surtout en période humide de l'année.

Les observations nocturnes réalisées sur les points d'écoute ont permis de recenser quatre (04) espèces de rapace nocturne, réparties en deux (02) familles dont trois (03) espèces (Petit-duc à face blanche : *Ptilopsis leucotis* ; Petit-duc africain : *Otus senegalensis* ; Chouette-pêcheuse de pel : *Scotopelia peli*) de la famille des Strigidae et une (01) espèce (Effraie des clochers : *Tyto alba*) de la famille des Tytonidae.

- **Petit-duc à face blanche (*Ptilopsis leucotis*)** est une espèce commune qui fréquente les zones boisées et la lisière des forêts. Il vit aussi dans les zones forestières qui bordent les rivières. Il est généralement nocturne. Il se nourrit des insectes, de petit reptile, de petits rongeurs, des oiseaux.
- **Petit-duc africain (*Otus senegalensis*)** est une espèce assez commune qui fréquente les zones boisées la lisière des forêts. Il se nourrit de petits rongeurs et des oiseaux. Il est généralement nocturne.
- **Effraie des clochers (*Tyto alba*)** est une espèce commune qui fréquente les milieux variés et surtout dans les habitations des hommes. Il est nocturne. Il se nourrit des lézards, des rongeurs et des oiseaux.
- **Chouette-pêcheuse de pel (*Scotopelia peli*)** est une espèce de rapace rare qui habite les forêts qui bordent l'eau. Elle est généralement nocturne et s'observe aussi le jour. Elle se nourrit de grenouilles et de poissons. Les observations de nuit ont été faites autour de l'îlot de forêt sacrée de Anavié à l'intérieur duquel se trouve un marigot temporaire. Raison pour laquelle la présence de la Chouette-pêcheuse de pel sur le site n'a pas été surprise.

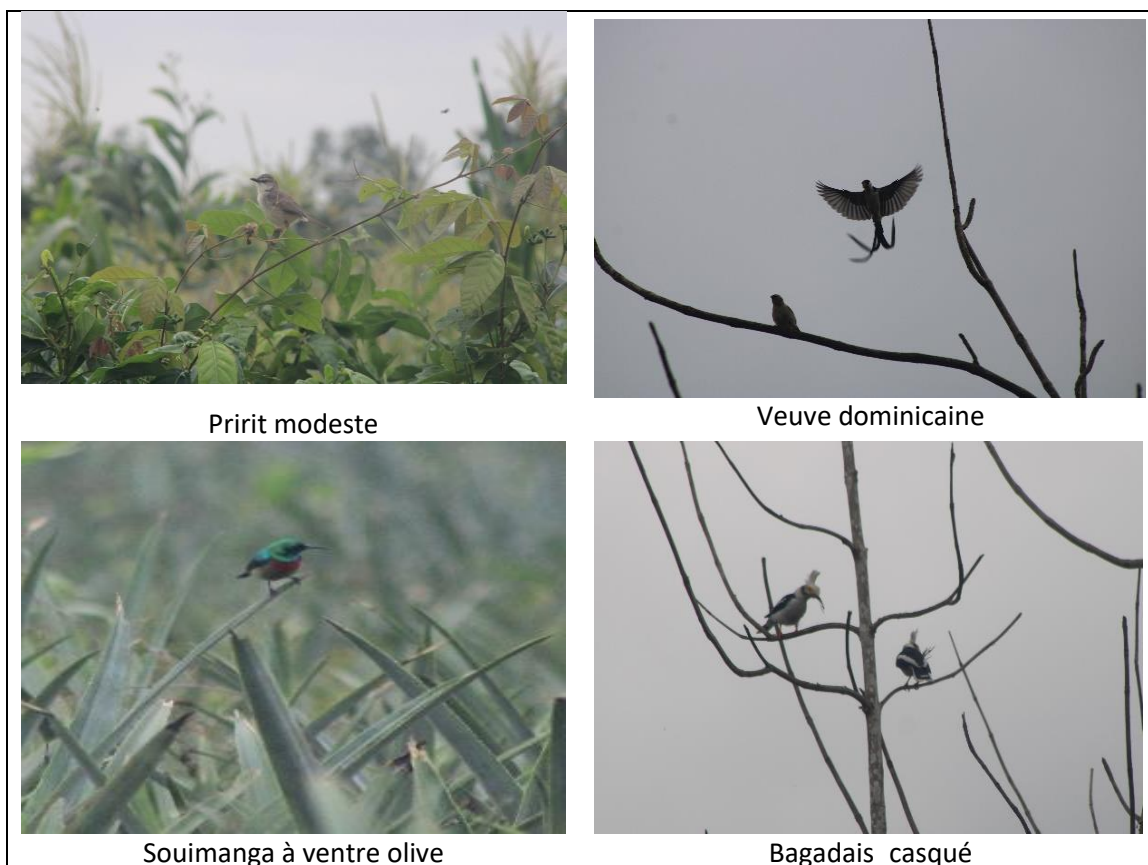


Figure 22 : Photographies d'espèces d'oiseau observées sur le site

### 3.7.2. Nidification des oiseaux

Les indices de reproduction et observation d'activité de nidification ont été observés sur le terrain. La nidification de certaines espèces est confirmée par l'observation directe des indices de nidification tels que le transport des brins pour la construction des nids, les plumages nuptiaux chez d'autres, les nids occupés, la ponte des œufs (figure 20) et la couvaison.



(Source : Antea, juillet 2020)

Figure 23 : Photographie du nid du Francolin à double éperon avec six (06) oeufs

Le Francolin à double éperon (*Pternistis bicalcaratus*) est une espèce commune observée deux (02) fois pour la ponte et la couvaison des œufs sur deux transects différents.

Ces indices confirment que le site est une zone de nidification pour certaines espèces. Celles dont le niveau de certitude de nidification est confirmé se résume au tableau ci-dessous.

Tableau 10 : Espèces d'oiseau dont la nidification sur le site est confirmé

Ordre	Famille	Espèce	Nom courant	Indices de nidification
Galliformes	Phasianidae	<i>Pternistis bicalcaratus</i>	Francolin à double éperon	Ponte et couvaison
Passeriformes	Ploceidae	<i>Ploceus cucullatus</i>	Tisserin gendarme	Nids occupés
Passeriformes	Estrildidae	<i>Estrilda melpoda</i>	Astrild à joues orange	Transport de Brins de végétation
Columbiformes	Columbidae	<i>Streptopelia semitorquata</i>	Tourterelle à collier	Transport de Brins de végétation
Cuculiformes	Cuculidae	<i>Chrysococcyx klaas</i>	Coucou de Klaas	Ponte (Parasite)
Cuculiformes	Cuculidae	<i>Chrysococcyx caprius</i>	Coucou Didric	Ponte (Parasite)
Passeriformes	Estrildidae	<i>Spermestes cucullatus</i>	Capucin nonnette	Transport de Brins de végétation
Passeriformes	Ploceidae	<i>Ploceus nigerrimus</i>	Tisserin noir	Nids occupés
Passeriformes	Ploceidae	<i>Amblyospiza albifrons</i>	Amblyospize à front blanc	Plumage nuptial
Passeriformes	Viduidae	<i>Vidua macroura</i>	Veuve dominicaine	Parade nuptiale
Passeriformes	Ploceidae	<i>Euplectes franciscanus</i>	Euplecte franciscain	Plumage nuptial

(Source : Antea, juillet-août 2020)

Au nombre des espèces citées dans le tableau ci-dessus, seul le Francolin à double éperon (*Pternistis bicalcaratus*) nidifie au sol. L'Astrild à joues orange (*Estrilda melpoda*) fait son nid dans les broussailles à environ 1 mètre au-dessus du sol.

### 3.7.3. Espèces d'oiseaux nécessitant une attention particulière

Au nombre des soixante (60) espèces d'oiseaux inventoriées sur le site, très peu sont des espèces à statut particulier. Aucune espèce recensée n'est endémique de la zone du site du projet. Les quelques espèces qui font objet de protection et nécessitant une attention particulière se résument dans le tableau ci-après. Selon la liste rouge de l'UICN toutes les espèces inventoriées sur le site sont de préoccupation mineure (annexe 2.a).

Tableau 11 : Espèces d'oiseaux nécessitant une attention particulière

Taxon	Noms scientifiques	Noms communs	Statut réglementation nationale	Statut liste rouge Bénin	Statut UICN
Oiseau	<i>Psittacula krameri</i>	Perruche à collier	B	NT	LC
Oiseau	<i>Scotopelia peli</i>	Chouette-pêcheuse de pel	A	Vu	LC

(A) Intégralement protégée ; (B) Partiellement protégée, (VU) Vulnérable, (NT) Quasi menacé, (LC) Préoccupation mineure

(Source : Antea, juillet-août 2020)

L'analyse du tableau montre que les espèces recensées sur le site présentent une espèce (01) vulnérables (VU) la Chouette-pêcheuse de pel (*Scotopelia peli*) et une espèce (01) considérée comme quasi menacée (NT) la Perruche à collier (*Psittacula krameri*) selon la liste rouge du Bénin.

### 3.8. Faune mammalienne

#### 3.8.1. Richesse spécifique et abondance

Avec les dix (10) caméras pièges installées au niveau des différentes formations végétales sur le site, sept (07) espèces dont un reptile ont été observé.

Les détails issus du dépouillement des images des caméras pièges se résume au tableaux suivants.

Tableau 12 : Résultat du dépouillement des photos prises par les caméras pièges

N° Caméra/Code	Nombre total de photo	Nombre de photo d'animaux	Nombre d'espèce	Nom courant
1/AC1	18981	0	0	Néant
2/LEA2S4	5	0	0	Néant
3/LEA2B14	7085	16	2	Scinque de Fernand et un inconnu
4/B002	54	6	2	Oiseau et Ecureuil
5/LEA2B10	50	16	4	Ecureuil, Francolin, Genette et Inconnu
6/AC2	19	6	1	Céphalophe de walter
7/B001	3466	4	1	oiseau
8/C4	13	4	1	Singe tantale
9/AC3	34	20	2	Rat de Gambie et Guib harnaché
10/A8	0	0	0	Néant

(Source : Antea, juillet-août 2020)

**Tableau 13 : Catégorisation des espèces de faune observées avec les caméras**

Espèces	Nom courant	Famille	Taxon
<i>Lepidothyris fernandi harlani</i>	Scinque de Fernand	Scincidae	Reptile
<i>Euxerus erythropus</i>	Ecureuil terrestre du Sénégal	Sciuridae	Mammifère
<i>Philantomba walteri</i>	Céphalophe de walter	Bovidae	Mammifère
<i>Tragelaphus scriptus</i>	Guib harnaché	Bovidae	Mammifère
<i>Chlorocebus aethiops tantalus</i>	Singe tantale	Cercopithecidae	Mammifère
<i>Cricetomys gambianus</i>	Rat de gambie	Cricetomynae	Mammifère
<i>Genetta tigrina</i>	Genette tigrine	Viverridae	Mammifère

(Source : Antea, juillet-août 2020)

Sur la base des données recueillies, le degré de présence des espèces observées a été calculé. Ce degré de présence est le rapport du nombre d'images de l'espèce par le nombre de caméra installé dans un habitat donné. Elle est présentée dans le tableau ci-après.

**Tableau 14 : Degré de présence des espèces capturées par les caméras pièges**

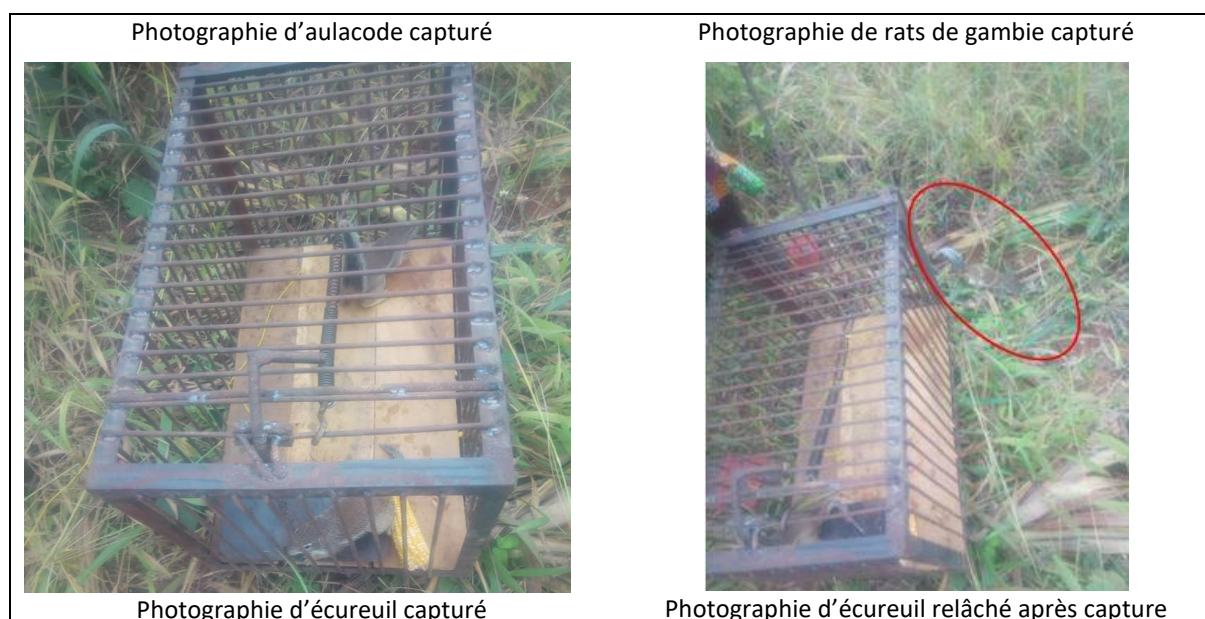
Espèces	Degré de présence
<i>Genetta tigrina</i>	8
<i>Euxerus erythropus</i>	2
<i>Cricetomys gambianus</i>	2
<i>Lepidothyris fernandi harlani</i>	1
<i>Philantomba walteri</i>	0,75
<i>Tragelaphus scriptus</i>	0,5
<i>Chlorocebus aethiops tantalus</i>	0,5

(Source : Antea, juillet- août 2020)

Outres les espèces observées à travers les images des caméras pièges, d'autres ont été capturées par les pièges non vulnérants. Il s'agit notamment : de l'aulacode (*Thryonomys swinderianus*), du rat de gambie (*Cricetomys gambianus*) et de l'ecureuil terrestre du Sénégal (*Euxerus erythropus*). Le faible degré de capture pourrait s'expliquer par la forte pression anthropique que subissent ces espèces (petits mammifères). En effet, elles sont les principales cibles de chasse au piège et au fusil dans la zone du projet. Ce qui les rend très méfiantes des objets étrangers dans leur environnement.







(Source : Antea, juillet- août 2020)

Figure 24 : Photographie des espèces de faune capturé par les pièges non vulnérant sur le site du projet

### 3.8.1.1. Espèces de mammifères nécessitant une attention particulière

De toutes les espèces de mammifères observées sur le site, quatre (04) retiennent l'attention car constituent une partie de la faune qui subsiste encore au sud du Bénin. Elles se résume dans le tableau ci-après.

Tableau 15 : Espèces de mammifères nécessitant une attention particulière

Taxon	Noms scientifiques	Noms communs	Statut réglementation nationale	Statut liste rouge Bénin	Statut UICN
Mammifère	<i>Tragelaphus scriptus</i>	Guib harnaché	B	NT	LC
Mammifère	<i>Philantomba walteri</i>	Céphalophe de walter	A	NT	LC
Mammifère	<i>Genetta tigrina</i>	Genette tigrine	A	NT	LC
Mammifère	<i>Chlorocebus aethiops tantalus</i>	Singe tantale	B	LC	LC

(Source : Antea, juillet- août 2020)

(A) Intégralement protégée ; (B) Partiellement protégée ; (LC) Préoccupation mineure ; (NT) Quasi menacé.

En référent à la Loi N°2002-16 du 18 Octobre 2004 portant régime de la faune en République du Bénin et le décret N° 2011 - 394 du 28 mai 2011 fixant les modalités de conservation, de développement et de gestion durable de la faune et de ses habitats en République du Bénin, l'analyse du tableau montre que les espèces recensées sur le site présentent une espèce (01) intégralement protégée (A) la genette tigrine (*Genetta tigrina*), deux espèces (02) partiellement protégée : le Guib harnaché (*Tragelaphus scriptus*) et le singe tantale



(*Chlorocebus aethiops tantalus*) et une (01) espèce dont le statut de conservation n'a pas été évalué selon la liste rouge du Bénin. Par ailleurs, toutes ces espèces ont une préoccupation mineure sur la liste rouge de l'UICN.

- **Guib harnaché (*Tragelaphus scriptus*)**

Le Guib harnaché est une antilope qui s'observe du nord au sud du pays. Elle habite les galeries forestières, les forêts claires, les lisières et les clairières dans les forêts denses, les plantations et les voisinages des villages. Elle consomme des feuilles, fleurs et herbes fraîches de différentes espèces. Sa catégorie de menace au niveau international (UICN) est mineure. En référence à la Loi N°2002-16 du 18 Octobre 2004 portant régime de la faune en République du Bénin et le décret N° 2011 - 394 du 28 mai 2011 fixant les modalités de conservation, de développement et de gestion durable de la faune et de ses habitats en République du Bénin, le guib harnaché (figure 24) est classé en annexe II. Donc partiellement protégé.



(Source : Antea, juillet 2020)

Figure 25 : photographie du Guib harnaché dans l'îlot forestier sacrée du site

- **Céphalophe de walter (*Philantomba walteri*)**

Le céphalophe de Walter (*Philantomba walteri*) est un mammifère ongulé mesurant moins de 40 cm de hauteur à l'épaule, et pèse entre 4 et 6 kg. On le rencontre dans l'Afrique de l'ouest, notamment au Togo, Bénin et au Nigeria. Cette espèce affectionne les formations denses et humides, les galeries forestières, les îlots forestiers et les mosaïques forêt-savane. C'est un herbivore qui consomme surtout les feuilles mais aussi des herbes.

Au Bénin ces habitats sont largement détruits de nos jours mais l'espèce s'adapte et s'accommode bien aux quelques formations reliques qui existent dans les espaces exploités par les hommes. L'espèce se trouve à travers tout le pays et constitue **la seule espèce de céphalophe à l'extrême sud du pays.**

Au niveau UICN, le Céphalophe de walter (figure 25) n'appartient pas à une catégorie de menace car, y a un manque important de données sur l'espèce.



(Source : Antea, août 2020)

Figure 26 : Photographie du Céphalophe de walter dans l'îlot forestier sacrée du site

- **Genette tigrine (*Genetta tigrina*)**

La genette tigrine (*Genetta tigrina*) est un mammifère carnivore qui vit dans les forêts denses sèches et se rencontre aussi dans les plantations. Classé en annexe I par la Loi N°2002-16 du 18 Octobre 2004 portant régime de la Faune en République du Bénin et le décret n° 2011 - 394 du 28 mai 2011 fixant les modalités de conservation, de développement et de gestion durable de la faune et de ses habitats en République du Bénin, la genette (figure 26) est intégralement protégée au Bénin. Selon la classification de l'UICN, la genette est d'une préoccupation mineure.



(Source : Antea, août 2020)

Figure 27: Photographie de la genette tigrine dans une plantation d'acacia sur le site

- **Singe tantale (*Chlorocebus aethiops tantalus*)**

Le singe tantale (figure 27) est un petit singe à longue queue. La longueur de la tête et du tronc est de 45 à 56 cm et sa queue de 45 à 72 cm avec un poids de 5,5 -9 kg. Il s'observe presque dans tout le pays et est très peu menacé. Il vit dans les forêts denses sèches et se nourrit de fruits, d'insectes, de feuilles et parfois d'œufs et d'oiseaux. Considéré comme nuisible à cause de ses prélèvements dans les champs, qui jouxtent son habitat, il est fort chassé par les agriculteurs (liste rouge Bénin p.242). Sur le site, les singes causent de plus en plus d'énormes dégâts dans les champs (maïs, niébé, manioc etc.) pour la simple raison que leur espace vital se rétrécit de jour en jour et ils sont obligés de jeter sur les cultures pour s'alimenter.

Le singe tantale est d'une préoccupation mineure au niveau de l'UICN ainsi que le Bénin et est classé en annexe II par la Loi N°2002-16 du 18 Octobre 2004 portant régime de la Faune en République du Bénin et le décret N° 2011 - 394 du 28 mai 2011 fixant les modalités de conservation, de développement et de gestion durable de la faune et de ses habitats en République du Bénin.





(Source : Antea, juillet 2020)

Figure 28 : Photographie du singe tantale dans l'îlot forestier sacrée du site

### 3.8.2. Indices de présence

Outre les observations directes par les caméras et le piégeage pour capture, qui permettent de confirmer la présence des espèces, les indices sont aussi indispensables et complémentaires pour mieux appréhender la faune d'un écosystème. La figure 28 présente quelques indices de présence ayant servi à la pose des caméras et des pièges dans les habitats identifiés. L'espèce dominante sur le site est l'aulacode vu que 95% du site est exploité pour des fins agricoles. Les aulacodes sont des mammifères rongeurs dont la ration alimentaire est composée d'au moins 70% de fourrages verts (aliments de base) et d'au plus 30% de compléments alimentaires énergétiques, azotés et minéraux-vitaminés (Mensah et Ekué, 2003 ; Mensah et al., 2007). Ce qui fait que sur le site du projet, ils sont beaucoup dans les champs (manioc, maïs, niébé).



Figure 29 : Photographies des indices de présence des espèces de faune sur le site

### 3.9. Menace sur la faune

L'effectif de la population humaine croît, et tous les hommes utilisent directement ou indirectement les ressources biologiques pour satisfaire les nombreux besoins vitaux entraînant une exploitation sans cesse croissante des ressources naturelles.

Le site du projet est dans une zone de forte production de l'ananas. L'ananas étant une culture héliophile, il ne supporte pas les systèmes agroforestiers. Pour cela, sa culture engendre le rasage total de la végétation naturelle. Ainsi, l'aire d'étude subit une forte altération par l'augmentation des zones agricoles. A cet effet, la principale menace sur la faune se résume essentiellement à la destruction des habitats et la pression de la chasse. La catégorie soumise beaucoup plus à la pression de chasse sont les rongeurs. Ils font objet de chasse non seulement pour la viande mais aussi pour leur organes et autres sous-produits utilisés en médecine traditionnelle (usage médico – magique).

Le seul habitat naturel résiduel du site (forêt sacrée) regorge encore quelques espèces de faune menacé au Bénin (liste rouge Bénin). A court ou à long terme si aucune mesure de conservation n'est prise, cette faune risque de disparaître à cause de la forte fréquentation de la forêt par les riverains.



## 4. Conclusion et suggestions

Le site du projet malgré le contexte de forte anthropisation regorge encore quelques espèces de faunes du Sud-Bénin et quelques espèces de flore à enjeux. Elles sont essentiellement confinées dans la relique forestière avec trois espèces de faune qui sont : le singe tantale, le guib harnaché et le céphalophe de walter. Au niveau floristique, il s'agit entre autres des espèces comme *Pouteria alnifolia*, *Triplochiton scleroxylon*, *Ceiba pentandra* etc. La sacralisation de cet îlot forestier a donc contribué à la conservation de ces espèces sur le site. Ceci confirme que la pression des hommes sur les ressources a grandement contribué à l'émiettement des habitats de la faune et par suite la diminution drastique de leur nombre.

Au vu des différents résultats obtenus, nous recommandons que la conservation de la relique de forêt sacrée soit intégrée dans le plan d'aménagement du site. En effet, le maintien de cet écosystème permettra de garantir la survie des individus de singe, de guib harnaché, de céphalophe et de genette qui y sont actuellement et pourrait favoriser l'installation d'autres. En plus de son maintien, il faudra procéder à un enrichissement avec des essences autochtones puis établir une ceinture verte de 3 à 4 rangées minimum tout autour pour améliorer la tranquillité des animaux.

Si en cas de force majeure, la forêt doit être détruite il faudra alors que le promoteur du projet procède à un reboisement compensatoire d'au moins 10 ha sur un site qui sera identifié par les autorités communales et l'administration forestière. Cette plantation devra être suivie pour au moins quatre (04) ans, le temps que les arbres atteignent un stade de développement raisonnable.

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## Annex VII **Water, air, soil and noise sampling data sheet**

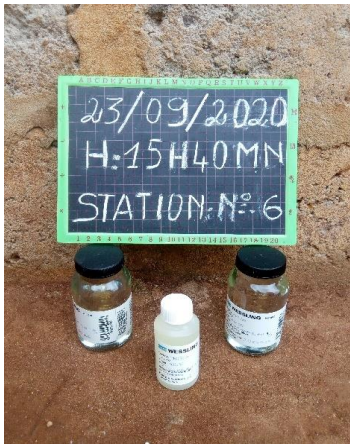

FICHE DE PRELEVEMENT DES EAUX SOUTERRAINES							Désignation de la station <b>BENP190008_GW_01</b>			
N° du projet		BENP190008			Coordonnées :					
Client		ARISE			X : 6.568163		m			
Site et commune		TORI			Y : 2.242312		m			
Opérateur		Janvier Atcho								
Date et heure		23/09/2020 16h36								
Saison		Saison des pluies								
Conditions climatiques		ciel nuageux depuis le matin								
Caractéristiques du puit										
Niveau eau :		NC	m/surface	Type de puit :		puits artisanal		Usage		Privé
Date de création du puit (si connu) :		NC		Aquifère capté :		NC		Profondeur ouvrage :		45 m
Etat de l'ouvrage à la date du prélèvement										
TETE DE L'OUVRAGE (à cocher)				Etat des sols autour du puit / usage & fonctionnement du puit				Activités à proximité :		
Type : <input checked="" type="checkbox"/> Hors-sol <input type="checkbox"/> PVC <input type="checkbox"/> PEHD <input type="checkbox"/> Ras de sol <input type="checkbox"/> Métallique				usage agricole privé				champs de maïs, manioc, plantation de cocos nucifera		
Etat (neuf, abîmé, ...) :				neuf						
Suivi des paramètres physico-chimiques mesurés sur site										
Temps de pompage (min)	Niveau dynamique (m/repère)	Débit de pompage	Volume purgé	Aspect de l'eau	Odeur	pH	Température (°C)	Conductivité (µS/cm)	Potentiel Redox (mV H <sup>+</sup> /H <sub>2</sub> )	O <sub>2</sub> dissous (mg O <sub>2</sub> /l)
-	-	lent	O/N	clair	non	6,41	28,40	375		
-	-	(pompage avec une poussette)								
-	-									
-	-									
-	-									
-	-									
-	-									
-	-									
Prélèvement des eaux souterraines							Date : 23/09/2020 à : 16h36			
Outil prélèvement :				seau, ...		Nettoyage / Rinçage :		oui		
Photographie de la station										
										
Gestion des échantillons										
Type de flaconnage (fourni par le labo)			Filtration	Analyses effectuées			Laboratoire :		WESSLING	
2 flacons verre 250 mL 1 flacon plastique 100 mL			NON	HCT C10-C40 + 8 métaux			Expédié le :		25/09/2020	
							Conditionnement :		Glacières réfrigérées	
Référence du matériel utilisé						Observations ou justification du non respect du mode opératoire				
Flaconnage du laboratoire, GPS, Seau, Récipient de 1L, Sonde multiparamètres, Papier absorbant, Gants, Sac poubelle, Ardoise & craie, Appareil photo, gel hydroalcoolique										




FICHE DE PRELEVEMENT DES EAUX SOUTERRAINES							Désignation de la station <b>BENP190008_GW_02</b>			
N° du projet	BENP190008					Coordonnées :				
Client	ARISE					X : 6.582752		m		
Site et commune	Zè					Y : 2.255506		m		
Opérateur	Janvier Atcho									
Date et heure	23/09/2020 17h37									
Saison	Saison des pluies									
Conditions climatiques	ciel nuageux depuis le matin									
Caractéristiques du puit										
Niveau eau :	NC	m/surface	Type de puit :	Forage avec château			Usage	Privé		
Date de création du puit (si	01/01/2015		Aquifère capté :	NC			Profondeur ouvrage :	50	m	
Etat de l'ouvrage à la date du prélèvement										
TETE DE L'OUVRAGE (à cocher)			Etat des sols autour du puit / usage & fonctionnement du puit				Activités à proximité :			
Type :	<input checked="" type="checkbox"/> Hors-sol	<input type="checkbox"/> PVC	<input checked="" type="checkbox"/> PEHD	usage agricole privé, Ferme d'élevage				plantation de palmier à huile + élevage		
	<input type="checkbox"/> Ras de sol	<input type="checkbox"/> Métallique								
Etat (neuf, abîmé, ...) :	neuf									
Suivi des paramètres physico-chimiques mesurés sur site										
Temps de pompage (min)	Niveau dynamique (m/repère)	Débit de pompage	Volume purgé	Aspect de l'eau	Odeur	pH	Température (°C)	Conductivité (µS/cm)	Potentiel Redox (mV H <sup>+</sup> /H <sub>2</sub> )	O <sub>2</sub> dissous (mg O <sub>2</sub> /l)
-	-	rapide	O/N	clair	non	5,20	28,00	63		
-	-									
-	-									
-	-									
-	-									
-	-									
-	-									
-	-									
Prélèvement des eaux souterraines							Date : 23/09/2020 à : 17h37			
Outil prélèvement :	seau, ...					Nettoyage / Rinçage : oui				
Photographie de la station										
										
Gestion des échantillons										
Type de flaconnage (fourni par le labo)			Filtration	Analyses effectuées			Laboratoire :	WESSLING		
2 flacons verre 250 mL 1 flacon plastique 100 mL			NON	HCT C10-C40 + 8 métaux			Expédié le :	25/09/2020		
							Conditionnement :	Glacières réfrigérées		
Référence du matériel utilisé						Observations ou justification du non respect du mode opératoire				
Flaconnage du laboratoire, GPS, Seau, Récipient de 1L, Sonde multiparamètres, Papier absorbant, Gants, Sac poubelle, Ardoise & craie, Appareil photo, gel hydroalcoolique										

FICHE DE PRELEVEMENT DES EAUX SOUTERRAINES							Désignation de la station <b>BENP190008_GW_03</b>			
N° du projet	BENP190008				Coordonnées :					
Client	ARISE				X : 6.604881		m			
Site et commune	Zè				Y : 2.255007		m			
Opérateur	Janvier Atcho									
Date et heure	23/09/2020 13h00									
Saison	Saison des pluies									
Conditions climatiques	ciel nuageux depuis le matin									
Caractéristiques du puit										
Niveau eau :	NC	m/surface	Type de puit :	Forage avec château	Usage	Privé				
Date de création du puit (si	inconnu		Aquifère capté :	NC	Profondeur ouvrage :	inconnu	m			
Etat de l'ouvrage à la date du prélèvement										
TETE DE L'OUVRAGE (à cocher)			Etat des sols autour du puit / usage & fonctionnement du puit				Activités à proximité :			
Type :	<input checked="" type="checkbox"/> Hors-sol	<input type="checkbox"/> PVC	<input checked="" type="checkbox"/> PEHD	usage agricole privé				champ de manioc		
	<input type="checkbox"/> Ras de sol	<input type="checkbox"/> Métallique								
Etat (neuf, abîmé, ...) :			neuf							
Suivi des paramètres physico-chimiques mesurés sur site										
Temps de pompage (min)	Niveau dynamique (m/repère)	Débit de pompage	Volume purgé	Aspect de l'eau	Odeur	pH	Température (°C)	Conductivité (µS/cm)	Potentiel Redox (mV H <sup>+</sup> /H <sub>2</sub> )	O <sub>2</sub> dissous (mg O <sub>2</sub> /l)
-	-	rapide	O/N	clair	non	5,90	29,00	133		
-	-									
-	-									
-	-									
-	-									
Prélèvement des eaux souterraines										
Outil prélèvement : seau, ...					Date : 23/09/2020			à : 13h00		
Nettoyage / Rinçage : oui										
Photographie de la station										
										
Gestion des échantillons										
Type de flaconnage (fourni par le labo)			Filtration	Analyses effectuées		Laboratoire :		WESSLING		
2 flacons verre 250 mL 1 flacon plastique 100 mL			NON	HCT C10-C40 + 8 métaux		Expédié le :		25/09/2020		
						Conditionnement :		Glacières réfrigérées		
Référence du matériel utilisé					Observations ou justification du non respect du mode opératoire					
Flaconnage du laboratoire, GPS, Seau, Récipient de 1L, Sonde multiparamètres, Papier absorbant, Gants, Sac poubelle, Ardoise & craie, Appareil photo, gel hydroalcoolique										

FICHE DE PRELEVEMENT DES EAUX SOUTERRAINES							Désignation de la station <b>BENP190008_GW_04</b>				
N° du projet		BENP190008			Coordonnées :						
Client		ARISE			X : 6.594084 m						
Site et commune		Zè			Y : 2.239802 m						
Opérateur		Janvier Atcho									
Date et heure		23/09/2020 14h10									
Saison		Saison des pluies									
Conditions climatiques		ciel nuageux depuis le matin									
Caractéristiques du puit											
Niveau eau :		NC		m/surface		Type de puit :		Forage avec château		Usage Privé	
Date de création du puit (si		01/04/2018				Aquifère capté :		NC		Profondeur ouvrage : 59 m	
Etat de l'ouvrage à la date du prélèvement											
TETE DE L'OUVRAGE (à cocher)				Etat des sols autour du puit / usage & fonctionnement du puit				Activités à proximité :			
Type : <input checked="" type="checkbox"/> Hors-sol <input checked="" type="checkbox"/> PVC <input type="checkbox"/> PEHD <input type="checkbox"/> Ras de sol <input type="checkbox"/> Métallique				usage agricole privé; interieur d'une église				champ d'ananas et plantation de palmier à huile			
Etat (neuf, abîmé, ...) :				neuf							
Suivi des paramètres physico-chimiques mesurés sur site											
Temps de pompage (min)	Niveau dynamique (m/repère)	Débit de pompage	Volume purgé	Aspect de l'eau	Odeur	pH	Température (°C)	Conductivité (µS/cm)	Potentiel Redox (mV H <sup>+</sup> /H <sub>2</sub> )	O <sub>2</sub> dissous (mg O <sub>2</sub> /l)	
-	-	rapide	O/N	clair	non	5,52	29,80	201			
-	-										
-	-										
-	-										
-	-										
Prélèvement des eaux souterraines						Date : 23/09/2020 à : 14h10					
Outil prélèvement : seau, ...						Nettoyage / Rinçage : oui					
Photographie de la station											
  											
Gestion des échantillons											
Type de flaconnage (fourni par le labo)			Filtration	Analyses effectuées			Laboratoire :		WESSLING		
2 flacons verre 250 mL 1 flacon plastique 100 mL			NON	HCT C10-C40 + 8 métaux			Expédié le :		25/09/2020		
							Conditionnement :		Glacières réfrigérées		
Référence du matériel utilisé						Observations ou justification du non respect du mode opératoire					
Flaconnage du laboratoire, GPS, Seau, Récipient de 1L, Sonde multiparamètres, Papier absorbant, Gants, Sac poubelle, Ardoise & craie, Appareil photo, gel hydroalcoolique											

FICHE DE PRELEVEMENT DES EAUX SOUTERRAINES							Désignation de la station <b>BENP190008_GW_06</b>			
N° du projet	BENP190008				Coordonnées :					
Client	ARISE				X : 6.56824		m			
Site et commune	TORI				Y : 2.221672		m			
Opérateur	Janvier Atcho									
Date et heure	23/09/2020 15h40									
Saison	Saison des pluies									
Conditions climatiques	ciel nuageux depuis le matin									
Caractéristiques du puit										
Niveau eau :	NC	m/surface	Type de puit :	Forage avec château			Usage	Privé		
Date de création du puit (si	01/09/2018		Aquifère capté :	NC			Profondeur ouvrage :	45	m	
Etat de l'ouvrage à la date du prélèvement										
TETE DE L'OUVRAGE (à cocher)				Etat des sols autour du puit / usage & fonctionnement du puit				Activités à proximité :		
Type :	<input checked="" type="checkbox"/> Hors-sol	<input type="checkbox"/> PVC	<input checked="" type="checkbox"/> PEHD	usage privé				champ de maïs et d'ananas		
	<input type="checkbox"/> Ras de sol	<input type="checkbox"/> Métallique								
Etat (neuf, abîmé, ...) :	neuf									
Suivi des paramètres physico-chimiques mesurés sur site										
Temps de pompage (min)	Niveau dynamique (m/repère)	Débit de pompage	Volume purgé	Aspect de l'eau	Odeur	pH	Température (°C)	Conductivité (µS/cm)	Potentiel Redox (mV H <sup>+</sup> /H <sub>2</sub> )	O <sub>2</sub> dissous (mg O <sub>2</sub> /l)
-	-	rapide	O/N	clair	non	5,55	28,70	100		
-	-									
-	-									
-	-									
-	-									
-	-									
-	-									
Prélèvement des eaux souterraines							Date : 23/09/2020 à : 15h40			
Outil prélèvement :	seau, ...				Nettoyage / Rinçage : oui					
Photographie de la station										
 										
Gestion des échantillons										
Type de flaconnage (fourni par le labo)			Filtration	Analyses effectuées			Laboratoire :	WESSLING		
2 flacons verre 250 mL 1 flacon plastique 100 mL			NON	HCT C10-C40 + 8 métaux			Expédié le :	25/09/2020		
							Conditionnement :	Glacières réfrigérées		
Référence du matériel utilisé						Observations ou justification du non respect du mode opératoire				
Flaconnage du laboratoire, GPS, Seau, Récipient de 1L, Sonde multiparamètres, Papier absorbant, Gants, Sac poubelle, Ardoise & craie, Appareil photo, gel hydroalcoolique										



FICHE DE PRELEVEMENT DES EAUX SOUTERRAINES							Désignation de la station <b>BENP190008_GW_05</b>			
N° du projet	BENP190008					Coordonnées :				
Client	ARISE					X : 6.582025		m		
Site et commune	TORI					Y : 2.217347		m		
Opérateur	Janvier Atcho									
Date et heure	23/09/2020 15h00									
Saison	Saison des pluies									
Conditions climatiques	ciel nuageux depuis le matin									
Caractéristiques du puit										
Niveau eau :	NC	m/surface	Type de puit :	Forage avec château		Usage	Privé			
Date de création du puit (si	inconnu		Aquifère capté :	NC		Profondeur ouvrage :	inconnu	m		
Etat de l'ouvrage à la date du prélèvement										
TETE DE L'OUVRAGE (à cocher)			Etat des sols autour du puit / usage & fonctionnement du puit				Activités à proximité :			
Type :	<input checked="" type="checkbox"/> Hors-sol	<input type="checkbox"/> PVC	<input checked="" type="checkbox"/> PEHD	usage agricole privé; ferme d'élevage				champ d'ananas et plantation de teck		
	<input type="checkbox"/> Ras de sol	<input type="checkbox"/> Métallique								
Etat (neuf, abîmé, ...)	neuf									
Suivi des paramètres physico-chimiques mesurés sur site										
Temps de pompage (min)	Niveau dynamique (m/repère)	Débit de pompage	Volume purgé	Aspect de l'eau	Odeur	pH	Température (°C)	Conductivité (µS/cm)	Potentiel Redox (mV H <sup>+</sup> /H <sub>2</sub> )	O <sub>2</sub> dissous (mg O <sub>2</sub> /l)
-	-	rapide	O/N	clair	non	5,48	28,00	147		
-	-									
-	-									
-	-									
-	-									
Prélèvement des eaux souterraines						Date : 23/09/2020 à : 15h00				
Outil prélèvement :	seau, ...				Nettoyage / Rinçage : oui					
Photographie de la station										
										
Gestion des échantillons										
Type de flaconnage (fourni par le labo)			Filtration	Analyses effectuées		Laboratoire :		WESSLING		
2 flacons verre 250 mL 1 flacon plastique 100 mL			NON	HCT C10-C40 + 8 métaux		Expédié le :		25/09/2020		
						Conditionnement :		Glacières réfrigérées		
Référence du matériel utilisé					Observations ou justification du non respect du mode opératoire					
Flaconnage du laboratoire, GPS, Seau, Récipient de 1L, Sonde multiparamètres, Papier absorbant, Gants, Sac poubelle, Ardoise & craie, Appareil photo, gel hydroalcoolique										



## FICHE DE PRELEVEMENT DE SOL

Désignation de la station

**BENP190008**

**\_Soil\_01**

N° du projet :	BENP190008	Coordonnées :	
Client :	ARISE	X : 6.607951	m
Site et commune :	Zè	Y : 2.258073	m
Opérateur(s) :	Janvier Atcho		

Date et heure	21/09/2020 11h30
Saison	Saison des pluies
Conditions climatiques	Pluie toute la journée du 20/09- journée ensoleillée le 21/09
Environnement de la station :	Parcelles en friche couverte essentiellement d'herbacées

Profondeur	Description sol	Eau	Observations
30 cm	Sol de couleur rouge, meuble, humide	cf indice eau ci-dessous	Culture d'ananas aux environs de la zone de prélèvement
	Présence de racine des végétaux		

Indices Eau : + légèrement humide

Photographie de la localisation du sondage - Photographies de la lithologie rencontrée



Gestion des échantillons			
Type de flaconnage (fourni par le labo)	4 flacons verre brun	Laboratoire :	WESSLING
		Expédié le :	25/09/2020
		Conditionnement :	réfrigérateur

Référence matériel utilisé

Flaconnage du laboratoire, houe, coupe coupe, truelle, gans, GPS, papier absorbant, gel hydroalcoolique, sac poubelle, Appareil photo, Ardoise & craie





## FICHE DE PRELEVEMENT DE SOL

Désignation de la station

**BENP190008****\_Soil\_02**

N° du projet :	BENP190008	Coordonnées :	
Client :	ARISE	X : 6.597809	m
Site et commune :	Zè	Y : 2.25887	m
Opérateur(s) :	Janvier Atcho		

Date et heure	21/09/2020 13h48
Saison	Saison des pluies
Conditions climatiques	Pluie toute la journée du 20/09- journée ensoleillée le 21/09

Environnement de la station :	interieur de la forêt sacrée d'anavié
-------------------------------	---------------------------------------

Profondeur	Description sol	Eau	Observations
20 cm	Sol de couleur noirâtre, argileux et humide avec quelques racines de plantes	cf indice eau ci-dessous	à l'intérieur de la forêt sacrée d'anavié

*Indices Eau : + légèrement humide*

Photographie de la localisation du sondage - Photographies de la lithologie rencontrée



## Gestion des échantillons

Type de flaconnage (fourni par le labo)	4 flacons verre brun	Laboratoire :	WESSLING
		Expédié le :	25/09/2020
		Conditionnement :	réfrigérateur

## Référence matériel utilisé

Flaconnage du laboratoire, houe, coupe coupe, truelle, gans, GPS, papier absorbant, gel hydroalcoolique, sac poubelle, Appareil photo, Ardoise &amp; craie



## FICHE DE PRELEVEMENT DE SOL

Désignation de la station

**BENP190008**

**\_Soil\_03**

N° du projet :	BENP190008	Coordonnées :	
Client :	ARISE	X : 6.59477	m
Site et commune :	Zè	Y : 2.249462	m
Opérateur(s) :	Janvier Atcho		

Date et heure	21/09/2020 12h45
Saison	Saison des pluies
Conditions climatiques	Pluie toute la journée du 20/09- journée ensoleillée le 21/09

Environnement de la station :	parcelle cultivée saison passée
-------------------------------	---------------------------------

Profondeur	Description sol	Eau	Observations
40 cm	Sol de couleur rouge, meuble et humide avec quelques débris de racines mortes	cf indice eau ci-dessous	toute la zone est une zone agricole

*Indices Eau : + légèrement humide*

Photographie de la localisation du sondage - Photographies de la lithologie rencontrée



Gestion des échantillons			
Type de flaconnage (fourni par le labo)	4 flacons verre brun	Laboratoire :	WESSLING
		Expédié le :	25/09/2020
		Conditionnement :	réfrigérateur

Référence matériel utilisé

*Flaconnage du laboratoire, houe, coupe coupe, truelle, gans, GPS, papier absorbant, gel hydroalcoolique, sac poubelle, Appareil photo, Ardoise & craie*





## FICHE DE PRELEVEMENT DE SOL

Désignation de la station

**BENP190008****\_Soil\_04**

N° du projet :	BENP190008	Coordonnées :	
Client :	ARISE	X : 6.587626	m
Site et commune :	Zè	Y : 2.234761	m
Opérateur(s) :	Janvier Atcho		

Date et heure	21/09/2020 15h05
Saison	Saison des pluies
Conditions climatiques	Pluie toute la journée du 20/09- journée ensoleillée le 21/09
Environnement de la station :	présence de culture de manioc

Profondeur	Description sol	Eau	Observations
55 cm	Sol de couleur rouge, meuble et humide avec présence de quelques radicelle de plantes	cf indice eau ci-dessous	zone agricole

*Indices Eau : + légèrement humide*

Photographie de la localisation du sondage - Photographies de la lithologie rencontrée



Gestion des échantillons			
Type de flaconnage (fourni par le labo)	4 flacons verre brun	Laboratoire :	WESSLING
		Expédié le :	25/09/2020
		Conditionnement :	réfrigérateur

Référence matériel utilisé

*Flaconnage du laboratoire, houe, coupe coupe, truelle, gans, GPS, papier absorbant, gel hydroalcoolique, sac poubelle, Appareil photo, Ardoise & craie*



## FICHE DE PRELEVEMENT DE SOL

Désignation de la station

**BENP190008****\_Soil\_05**

N° du projet :	BENP190008	Coordonnées :	
Client :	ARISE	X : 6.587626	m
Site et commune :	TORI	Y : 2.234761	m
Opérateur(s) :	Janvier Atcho		

Date et heure	21/09/2020 16h19
Saison	Saison des pluies
Conditions climatiques	Pluie toute la journée du 20/09- journée ensoleillée le 21/09

Environnement de la station :	Zone en friche
-------------------------------	----------------

Profondeur	Description sol	Eau	Observations
25 cm	Sol humide de couleur noirâtre, meuble	cf indice eau ci-dessous	zone agricole

*Indices Eau : + légèrement humide*

Photographie de la localisation du sondage - Photographies de la lithologie rencontrée



## Gestion des échantillons

Type de flaconnage (fourni par le labo)	4 flacons verre brun	Laboratoire :	WESSLING
		Expédié le :	25/09/2020
		Conditionnement :	réfrigérateur

## Référence matériel utilisé

*Flaconnage du laboratoire, houe, coupe coupe, truelle, gans, GPS, papier absorbant, gel hydroalcoolique, sac poubelle, Appareil photo, Ardoise & craie*





## FICHE DE PRELEVEMENT DE SOL

Désignation de la station

**BENP190008**  
**\_Soil\_06**

N° du projet :	BENP190008	Coordonnées :	
Client :	ARISE	X : 6.57314	m
Site et commune :	TORI	Y : 2.244142	m
Opérateur(s) :	Janvier Atcho		
Date et heure	21/09/2020 17h40		
Saison	Saison des pluies		
Conditions climatiques	Pluie toute la journée du 20/09- journée ensoleillée le 21/09		
Environnement de la station :	Zone en friche		
Profondeur	Description sol	Eau	Observations
25 cm	Sol de couleur rougeâtre, humide, meuble	cf indice eau ci-dessous	zone agricole

Indices Eau : + légèrement humide

Photographie de la localisation du sondage - Photographies de la lithologie rencontrée





## Gestion des échantillons

Type de flaconnage (fourni par le labo)	4 flacons verre brun	Laboratoire :	WESSLING
		Expédié le :	25/09/2020
		Conditionnement :	réfrigérateur

## Référence matériel utilisé

Flaconnage du laboratoire, houe, coupe coupe, truelle, gans, GPS, papier absorbant, gel hydroalcoolique, sac poubelle, Appareil photo, Ardoise &amp; craie

		<b>FICHE DE PRELEVEMENT DE SOL</b>		Désignation de la station <b>BENP190008</b> <b>_Soil_07</b>	
N° du projet : BENP190008 Client : ARISE Site et commune : TORI Opérateur(s) : Janvier Atcho		Coordonnées : X : 6.56237 m Y : 2.235677 m			
Date et heure : 21/09/2020 17h15 Saison : Saison des pluies Conditions climatiques : Pluie toute la journée du 20/09- journée ensoleillée le 21/09					
Environnement de la station : Terre agricole					
Profondeur	Description sol	Eau	Observations		
25 cm	Sol de couleur rougeâtre, humide, meuble	cf indice eau ci-dessous	zone agricole		
Indices Eau : + légèrement humide					
Photographie de la localisation du sondage - Photographies de la lithologie rencontrée					
					
Gestion des échantillons					
Type de flaconnage (fourni par le labo)	4 flacons verre brun	Laboratoire :	WESSLING		
		Expédié le :	25/09/2020		
		Conditionnement :	réfrigérateur		
Référence matériel utilisé					
Flaconnage du laboratoire, houe, coupe coupe, truelle, gans, GPS, papier absorbant, gel hydroalcoolique, sac poubelle, Appareil photo, Ardoise & craie					





## FICHE DE PRELEVEMENT DE SOL

Désignation de la station

**BENP190008**  
**\_Soil\_08**

N° du projet :	BENP190008	Coordonnées :	
Client :	ARISE	X : 6.569434	m
Site et commune :	TORI	Y : 2.230454	m
Opérateur(s) :	Janvier Atcho		
Date et heure	21/09/2020 16h53		
Saison	Saison des pluies		
Conditions climatiques	Pluie toute la journée du 20/09- journée ensoleillée le 21/09		
Environnement de la station :	culture itinérante sur brûlis		

Profondeur	Description sol	Eau	Observations
30 cm	Sol de couleur rougeâtre, humide, présence de racine de végétaux	cf indice eau ci-dessous	Terrain autrefois couvert d'une plantation de teck qui a été brûlée au profit de l'agriculture

*Indices Eau : - sec / + légèrement humide / ++ humide / +++ noyé*

Photographie de la localisation du sondage - Photographies de la lithologie rencontrée







## Gestion des échantillons





Type de flaconnage (fourni par le labo)	4 flacons verre brun	Laboratoire :	WESSLING
		Expédié le :	25/09/2020
		Conditionnement :	réfrigérateur

## Référence matériel utilisé

*Flaconnage du laboratoire, houe, coupe coupe, truelle, gans, GPS, papier absorbant, gel hydroalcoolique, sac poubelle, Appareil photo, Ardoise & craie*

 <b>FICHE DE PRELEVEMENT AIR</b>		<b>Désignation du point</b> <b>BENP190008_AI</b> <b>R_01</b>	
<b>N° du projet :</b> BENP190008 <b>Client :</b> ARISE <b>Site et commune :</b> Zé <b>Opérateur(s) :</b> Janvier Atcho		<b>Coordonnées :</b> X : 6.605017 m Y : 2.254982 m	
<b>Date et heure :</b> 19/09/2020 11h (pose) - dépose le 25/09 <b>Saison :</b> Saison des pluies <b>Conditions climatiques pendant la pose :</b> <i>Pluie toute la journée du 18/09- journée ensoleillée le 19/09</i>			
<b>Environnement de la station :</b> <i>Zone agricole, Habitation du gardien dans une plantation de palmier à huile</i>			
<b>Poussières (Voir rapport sur les mesures de poussière)</b>			
<b>Heure de début</b>		<b>Heure de fin</b>	
PM 2,5		PM 10	
		PM total	
<b>Radiello</b>			
Présence du blanc : <input type="checkbox"/> Oui <input checked="" type="checkbox"/> Non Si oui, référence : -			
<b>n° identification du radiello</b>	<b>Type de prélèvement</b>	<b>Hauteur du prélèvement</b>	
n°X868H	Radiello 130 - COV ISO	2 mètres	
n°X028U	Radiello 170 - H2S	2 mètres	
n°Y199C	Radiello 166 - Nitrite NO2	2 mètres	
n°Y200C	Radiello 166 - SO2	2 mètres	
n°X865H	Radiello 172 - Ozone	2 mètres	
<b>Photographie de la station de radiello</b>		<b>Photographies de l'environnement proche</b>	
			
<b>Gestion des échantillons</b>			
<b>Type de tubes passifs</b>	Radiellos	<b>Laboratoire :</b>	WESSLING
		<b>Expédié le :</b>	25/09/2020
		<b>Conditionnement</b>	Glacière
<b>Référence matériel utilisé</b>			
Tube et support diffusif; fil de fer; Appareil photo; GPS; Gants; Papier absorbant; Sac poubelle; gel hydroalcoolique			




 <b>FICHE DE PRELEVEMENT AIR</b>		<b>Désignation du point</b> <b>BENP190008_AI</b> <b>R_02</b>	
<b>N° du projet :</b> BENP190008 <b>Client :</b> ARISE <b>Site et commune :</b> TORI <b>Opérateur(s) :</b> Janvier Atcho		<b>Coordonnées :</b> <b>X :</b> 6.56872 m <b>Y :</b> 2.223121 m	
<b>Date et heure :</b> 19/09/2020 14h (pose) - dépose le 25/09 <b>Saison :</b> Saison des pluies <b>Conditions climatiques pendant la pose :</b> Pluie toute la journée du 18/09- journée ensoleillée le 19/09			
<b>Environnement de la station :</b> Zone agricole, habitation située à la lisière d'une plantation de teck, Ferme d'élevage à 100 m environ de			
<b>Poussières (Voir rapport sur les mesures de poussière)</b>			
<b>Heure de début</b>		<b>Heure de fin</b>	
<b>PM 2,5</b>		<b>PM 10</b>	
		<b>PM total</b>	
<b>Radiello</b>			
<b>Présence du blanc :</b> <input type="checkbox"/> Oui <input checked="" type="checkbox"/> Non Si oui, référence : -			
<b>n° identification du radiello</b>	<b>Type de prélèvement</b>	<b>Hauteur du prélèvement</b>	
n°X869H	Radiello 130 - COV ISO	2 mètres	
n°X031U	Radiello 170 - H2S	2 mètres	
n°Y202C	Radiello 166 - Nitrite NO2	2 mètres	
n°Y201C	Radiello 166 - SO2	2 mètres	
n°X866H	Radiello 172 - Ozone	2 mètres	
<b>Photographie de la station de radiello</b>		<b>Photographies de l'environnement proche</b>	
			
<b>Gestion des échantillons</b>			
<b>Type de tubes passifs</b>	Radiellos	<b>Laboratoire :</b>	WESSLING
		<b>Expédié le :</b>	25/09/2020
		<b>Conditionnement :</b>	Glacière
<b>Référence matériel utilisé</b>			
Tube et support diffusif; fil de fer; Appareil photo; GPS; Gants; Papier absorbant; Sac poubelle; gel hydroalcoolique			

 <b>FICHE DE MESURE DE BRUIT</b>		Désignation du point	
		<b>BENP190008_ BR_01</b>	
N° du projet :	BENP190008	Coordonnées :	
Client :	ARISE	X : 6.605787 m	
Site et commune :	Zé	Y : 2.251196 m	
Opérateur(s) :	Janvier Atcho		
Période d'analyse			
Heure de début	13h	Heure de fin	13h45'
		Durée de la mesure (min)	45'
Norme de mesurage	NC	Emplacement du sonomètre	5 m de la piste
Appareillage	NC	Hauteur sonomètre	2 mètres
Type de mesure	NC	Orientation du micro	Vers la piste
Bruits perçus dominant (fond sonore)	Frottement des feuilles dû au vent		
Bruits ponctuels significatifs (noter l'heure)	Passage de moto à 13h 10'		
Conditions météorologiques			
Vent - force	Moyen	Rayonnement	Faible
Vent - direction	Sud-est	Nébulosité	Ciel dégagé
Surface	Humide		
Conclusions	Conditions météorologiques défavorables pour la propagation sonore (U2, T2)		
Caractéristique du site			
Environnement immédiat	Plantation d'Accasia auriculiformis		
Distance à l'infrastructure la plus proche (m)	45 m		
Hauteur de cette infrastructure (m)	4 m		
Revêtement du sol	sol nu	Trafic routier (O/N)	Oui
		Si oui, densité	faible
Photographie de la station de mesure		Photographies de l'environnement proche	
			
			

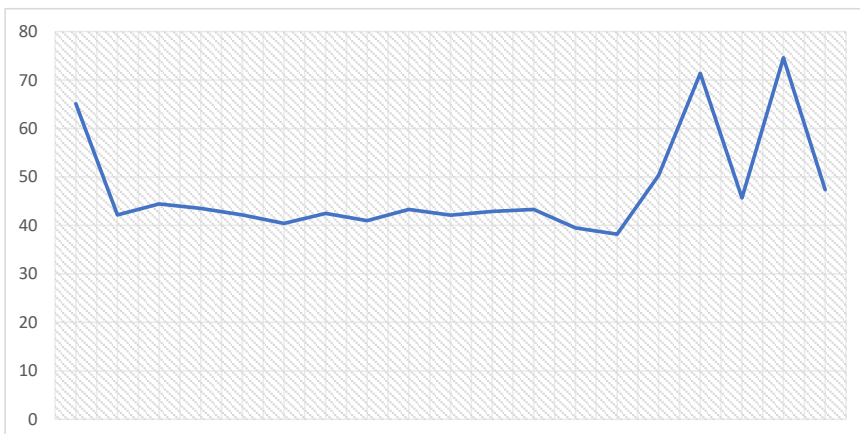
Profil d'enregistrement - résultat de la mesure









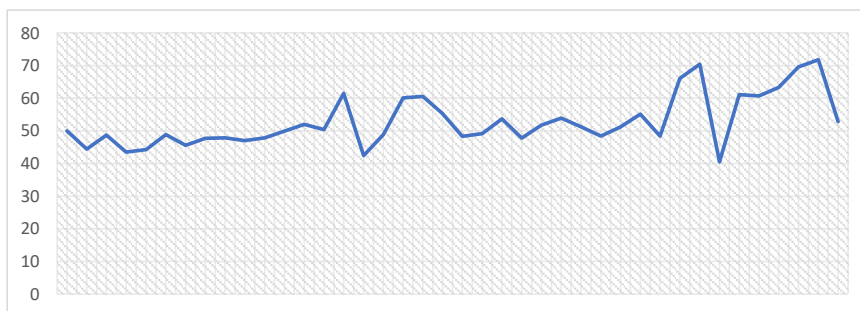
 <div style="text-align: center;"> <b>FICHE DE MESURE DE BRUIT</b> </div>		Désignation du point <b>BENP190008_</b> <b>BR_02</b>	
N° du projet : BENP190008 Client : ARISE Site et commune : Zé Opérateur(s) : Janvier Atcho		Coordonnées : X : 6.600654 m Y : 2.259869 m	
Période d'analyse			
Heure de début	14h 20'	Heure de fin	14h 50'
		Durée de la mesure (min)	30
Norme de mesurage	NC	Emplacement du sonomètre	à 10 mètres de la piste
Appareillage	NC	Hauteur sonomètre	2 mètres
Type de mesure	NC	Orientation du micro	Vers la piste
Bruits perçus dominant (fond sonore) <i>Frottement des feuilles dû au vent</i>			
Bruits ponctuels significatifs (noter l'heure) <i>Passage de véhicule à 14h 33'</i>			
Conditions météorologiques			
Vent - force	Vent moyen	Rayonnement	Moyen
Vent - direction	Sud-est	Nébulosité	Ciel dégagé
Surface	Humide		
Conclusions <i>Conditions météorologiques défavorables pour la propagation sonore</i>			(U2, T2)
Caractéristique du site			
Environnement immédiat <i>Champ d'ananas</i>			
Distance à l'infrastructure la plus proche (m)		60 m	
Hauteur de cette infrastructure (m)		4 mètres	
Revêtement du sol	Ciment	Trafic routier (O/N)	Oui
		Si oui, densité	faible
Photographie de la station de mesure		Photographies de l'environnement proche	
			

Profil d'enregistrement - résultat de la mesure


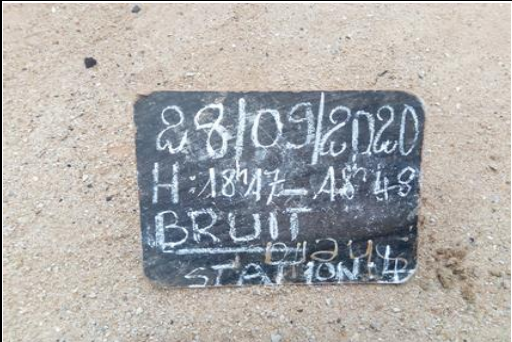




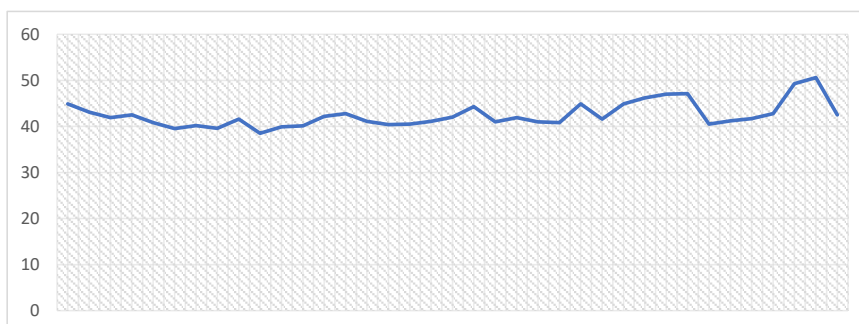
 <div style="text-align: center;"> <b>FICHE DE MESURE DE BRUIT</b> </div>		<b>Désignation du point</b> <b>BENP190008_</b> <b>BR_03</b>	
<b>N° du projet :</b> BENP190008 <b>Client :</b> ARISE <b>Site et commune :</b> Zé <b>Opérateur(s) :</b> Janvier Atcho		<b>Coordonnées :</b> X : 6.583156 m Y : 2.257806 m	
<b>Période d'analyse</b>			
<b>Heure de début</b>	15h 49'	<b>Heure de fin</b>	16h 33'
		<b>Durée de la mesure (min)</b>	42
<b>Norme de mesurage</b>	NC	<b>Emplacement du sonomètre</b>	à 10 mètres de la piste
<b>Appareillage</b>	NC	<b>Hauteur sonomètre</b>	2 mètres
<b>Type de mesure</b>	NC	<b>Orientation du micro</b>	Vers la piste
<b>Bruits perçus dominant (fond sonore)</b> <i>Frottement des feuilles dû au vent</i>			
<b>Bruits ponctuels significatifs (noter l'heure)</b> <i>Passage de moto à 16h 27'</i>			
<b>Conditions météorologiques</b>			
<b>Vent - force</b>	<i>Vent moyen</i>	<b>Rayonnement</b>	<i>Faible</i>
<b>Vent - direction</b>	<i>Sud-est</i>	<b>Nébulosité</b>	<i>Ciel dégagé</i>
<b>Surface</b>	<i>Humide</i>		
<b>Conclusions</b>	<i>Conditions météorologiques défavorables pour la propagation sonore (U2, T2)</i>		
<b>Caractéristique du site</b>			
<b>Environnement immédiat</b>	<i>Terre agricole</i>		
<b>Distance à l'infrastructure la plus proche (m)</b>	20 mètres		
<b>Hauteur de cette infrastructure (m)</b>	5 mètres		
<b>Revêtement du sol</b>	<i>Ciment</i>	<b>Trafic routier (O/N)</b>	<i>Oui</i> <b>Si oui, densité</b> <i>très faible</i>
<b>Photographie de la station de mesure</b>		<b>Photographies de l'environnement proche</b>	
			
			





Profil d'enregistrement - résultat de la mesure



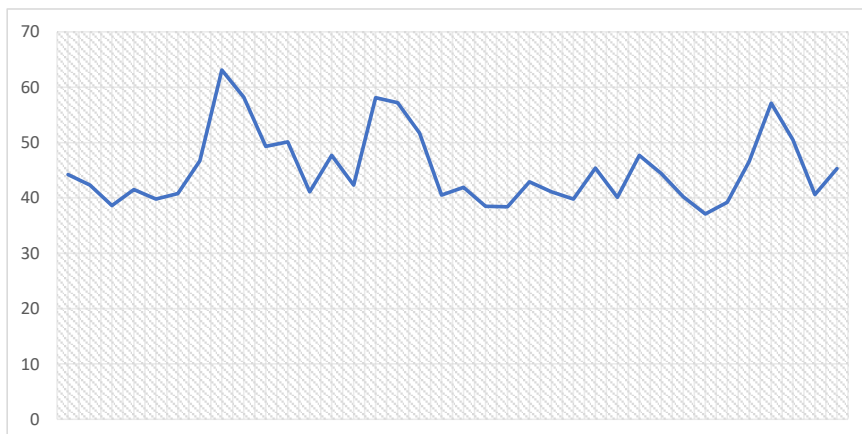


 <div style="text-align: center;"> <b>FICHE DE MESURE DE BRUIT</b> </div>		Désignation du point <b>BENP190008_</b> <b>BR_04</b>	
N° du projet : BENP190008 Client : ARISE Site et commune : TORI Opérateur(s) : Janvier Atcho		Coordonnées : X : 6.568231 m Y : 2.22182 m	
Période d'analyse			
Heure de début	18h 17'	Heure de fin	18h 48'
		Durée de la mesure (min)	31
Norme de mesurage	NC	Emplacement du sonomètre	à 6 mètres de la piste
Appareillage	NC	Hauteur sonomètre	2 mètres
Type de mesure	NC	Orientation du micro	vers la piste
Bruits perçus dominant (fond sonore) <i>Frottement des feuilles dû au vent</i>			
Bruits ponctuels significatifs (noter l'heure) <i>Cris du coq</i>			
Conditions météorologiques			
Vent - force	Vent moyen	Rayonnement	Faible
Vent - direction	Sud-est	Nébulosité	Ciel dégagé.
Surface	Humide		
Conclusions <i>Conditions météorologiques défavorables pour la propagation sonore</i>			(U2, T2)
Caractéristique du site			
Environnement immédiat	Terre Aricole		
Distance à l'infrastructure la plus proche (m)	25 m		
Hauteur de cette infrastructure (m)	6 m		
Revêtement du sol	Ciment	Trafic routier (O/N)	Oui
		Si oui, densité	Très faible
Photographie de la station de mesure		Photographies de l'environnement proche	
			
			
Profil d'enregistrement - résultat de la mesure			



 <h2 style="text-align: center;">FICHE DE MESURE DE BRUIT</h2>		Désignation du point	
		<b>BENP190008_</b> <b>BR_05</b>	
N° du projet :	BENP190008	Coordonnées :	
Client :	ARISE	X : 6.586422 m	
Site et commune :	Zè	Y : 2.243038 m	
Opérateur(s) :	Janvier Atcho		
Période d'analyse			
Heure de début	17h 2'	Heure de fin	17h 43'
		Durée de la mesure (min)	41
Norme de mesurage	NC	Emplacement du sonomètre	3 mètres de la piste
Appareillage	NC	Hauteur sonomètre	2 mètres
Type de mesure	NC	Orientation du micro	Vers la piste
Bruits perçus dominant (fond sonore)	Frottement des feuilles dû au vent		
Bruits ponctuels significatifs (noter l'heure)	Passage de moto		
Conditions météorologiques			
Vent - force	Vent moyen	Rayonnement	Faible
Vent - direction	Sud-est	Nébulosité	Ciel dégagé
Surface	Humide		
Conclusions	Conditions météorologiques défavorables pour la propagation sonore		(U2, T2)
Caractéristique du site			
Environnement immédiat	Terre agricole		
Distance à l'infrastructure la plus proche (m)	NC		
Hauteur de cette infrastructure (m)	NC		
Revêtement du sol	Terre battue	Trafic routier (O/N)	Oui
		Si oui, densité	Très faible
Photographie de la station de mesure		Photographies de l'environnement proche	
			
			

Profil d'enregistrement - résultat de la mesure



## Annex VIII **Report on water, air and soil analysis results**

**WESSLING**

Quality of Life

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**ANTEA GROUP**  
**Madame Marion VICHIER-GUERRE**  
**Antony Parc I**  
**2 avenue du Général de Gaulle**  
**92160 ANTONY**

N° rapport d'essai	ULY20-019136-1
N° commande	ULY-16635-20
Interlocuteur (interne)	Y. Lafond
Téléphone	+33 474 990 554
Courrier électronique	y.lafond@wessling.fr
Date	12.10.2020

## Rapport d'essai

***BENP 190008***



Les résultats ne se rapportent qu'aux échantillons soumis à l'essai et tels qu'ils ont été reçus.

Les paramètres couverts par l'accréditation EN ISO/CEI 17025 sont marqués d'un (A) et leurs résultats sont accrédités sauf avis contraire en remarque.

La portée d'accréditation NAH n°NAH-1-1009 du laboratoire WESSLING Hongrois de Budapest est disponible sur le site [www.nah.gov.hu](http://www.nah.gov.hu) pour les résultats accrédités par ce laboratoire.

Ce rapport d'essai ne peut être reproduit que sous son intégralité et avec l'autorisation des laboratoires WESSLING.

Les laboratoires WESSLING autorisent leurs clients à extraire tout ou partie des résultats d'essai envoyés à titre indicatif sous format excel uniquement à des fins de retraitement, de suivi et d'interprétation de données sans faire allusion à l'accréditation des résultats d'essai.

Les données fournies par le client sont sous sa responsabilité et identifiées en italique.



Le 12.10.2020

N° d'échantillon

20-154033-01

20-154033-02

Désignation d'échantillon

Unité

**BENP**  
**190008\_AIR\_01**

**BENP**  
**190008\_AIR\_02**

Schwefelwasserstoff in Gas - MSZ 21456-2 - Réalisé par WESSLING Budapest (Hongrie)

Sulfure d'hydrogène (H2S) (A)	µg/ech. G	<50	<50		
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Nitrite - D'ap EN 26777 - Réalisé par WESSLING Lyon (France)

Nitrites (NO2)	µg G	2,3	3,2		
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Sulfites - D'ap EN ISO 10304-1 - Réalisé par WESSLING Lyon (France)

Sulfates (SO4)	µg G	<1	<1		
Sulfite (SO3)	µg G	<1	1,87		
Dioxyde de soufre (SO2)	µg G	<1	1,87		

Ozone (air des lieux de travail) - WBSE 4500-03 - Réalisé par WESSLING Budapest (Hongrie)

Ozone	µg G	5,4	4,9		
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COV sur gaz - ISO 16200-2 - Réalisé par WESSLING Budapest (Hongrie)

Benzène (A)	µg/ech. G	<1,00	2,00		
Diméthylformamide (A)	µg/ech. G	<1,00	<1,00		
Toluène (A)	µg/ech. G	<1,00	3,00		
Ethylbenzène (A)	µg/ech. G	<1,00	<1,00		
o-Xylène (A)	µg/ech. G	<1,00	<1,00		
Cumène (A)	µg/ech. G	<1,00	<1,00		
Chlorobenzène (A)	µg/ech. G	<1,00	<1,00		
1,4-Dichlorobenzène (A)	µg/ech. G	<1,00	<1,00		
Dichlorométhane (A)	µg/ech. G	<1,00	<1,00		
Trichlorométhane (A)	µg/ech. G	<1,00	<1,00		
1,1,1-Trichloroéthane (A)	µg/ech. G	<1,00	<1,00		
Tétrachlorométhane (A)	µg/ech. G	<1,00	<1,00		
Trichloroéthylène (A)	µg/ech. G	<1,00	<1,00		
Tétrachloroéthylène (A)	µg/ech. G	<1,00	<1,00		
1,2-Dichloroéthane (A)	µg/ech. G	<1,00	<1,00		
Éthanol (A)	µg/ech. G	<1,00	<1,00		
Isopropanol (A)	µg/ech. G	<1,00	<1,00		
Acétate de méthyle (A)	µg/ech. G	<1,00	<1,00		
Acétate d'éthyle (A)	µg/ech. G	<1,00	<1,00		
Naphtalène (A)	µg/ech. G	<1,00	<1,00		
1,2-Dichloropropane (A)	µg/ech. G	<1,00	<1,00		
Dodécane (A)	µg/ech. G	2,00	1,00		
n-Heptane (A)	µg/ech. G	<1,00	<1,00		
n-Hexane (A)	µg/ech. G	<1,00	2,00		
n-Nonane (A)	µg/ech. G	<1,00	<1,00		
Undécane (A)	µg/ech. G	<1,00	<1,00		
n-Acétate de propyle (A)	µg/ech. G	<1,00	<1,00		
Méthyl-tertiobutyl éther (MTBE) (A)	µg/ech. G	<1,00	<1,00		
Styrène (A)	µg/ech. G	<1,00	<1,00		
Acétone (A)	µg/ech. G	<1,00	<1,00		
n-Pentane (A)	µg/ech. G	<1,00	8,00		
Tétrahydrofurane (THF) (A)	µg/ech. G	<1,00	<1,00		
n-Propylbenzène (A)	µg/ech. G	<1,00	<1,00		
tert-Butanol (A)	µg/ech. G	<1,00	<1,00		



Le 12.10.2020

N° d'échantillon

20-154033-01

20-154033-02

Désignation d'échantillon

Unité

**BENP**  
**190008\_AIR\_01**

**BENP**  
**190008\_AIR\_02**

Butanol-2 (A)	µg/ech. G	<1,00	<1,00		
Nitrile acrylique (A)	µg/ech. G	<1,00	<1,00		
Ethyl-tertiobutyléther (ETBE) (A)	µg/ech. G	<1,00	<1,00		
1-Méthoxy-2-propyl acétate (A)	µg/ech. G	<1,00	<1,00		
1,2,4-Triméthylbenzène (Pseudocumène) (A)	µg/ech. G	<1,00	<1,00		
Cyclohexanone (A)	µg/ech. G	<1,00	<1,00		
1-Méthoxy-2-propanol (A)	µg/ech. G	<1,00	<1,00		
Butanol-1 (A)	µg/ech. G	<1,00	<1,00		
Méthacrylate de méthyle (A)	µg/ech. G	<1,00	<1,00		
2-Ethyl-1-hexanol (A)	µg/ech. G	<1,00	<1,00		
1,4-Dioxane (A)	µg/ech. G	<1,00	<1,00		
Acétate d'isopropyle (A)	µg/ech. G	<1,00	<1,00		
Isobutylacétate (A)	µg/ech. G	<1,00	<1,00		
Méthyléthylcétone (A)	µg/ech. G	<1,00	<1,00		
Diéthyléther (A)	µg/ech. G	<1,00	<1,00		
Méthyl-2 propanol-1 (A)	µg/ech. G	<1,00	<1,00		
Octane (A)	µg/ech. G	<1,00	<1,00		
Cyclohexanol (A)	µg/ech. G	<1,00	<1,00		
Méthylisobutylcétone (A)	µg/ech. G	<1,00	<1,00		
Méthylcyclohexane (A)	µg/ech. G	<1,00	<1,00		
alpha-Pinène (A)	µg/ech. G	<1,00	<1,00		
4-Hydroxy-4-méthylpentan-2-one (diacétone alcool) (A)	µg/ech. G	<1,00	<1,00		
2-Méthoxyéthanol (A)	µg/ech. G	<1,00	<1,00		
2-Ethoxyéthyl acetate (A)	µg/ech. G	<1,00	<1,00		
Isooctane (A)	µg/ech. G	<1,00	<1,00		
m-, p-Xylène (A)	µg/ech. G	<1,00	1,00		
Acétonitrile (A)	µg/ech. G	<1,00	<1,00		
Alcool benzylique (A)	µg/ech. G	<1,00	<1,00		
Bromochlorométhane (A)	µg/ech. G	<1,00	<1,00		
Acétate de butyle (A)	µg/ech. G	<1,00	<1,00		
2-Butoxyéthanol (A)	µg/ech. G	<1,00	<1,00		
Acétate de 2-Butoxyéthyle (A)	µg/ech. G	<1,00	<1,00		
Cyclohexane (A)	µg/ech. G	<1,00	<1,00		
1-Hexanol (A)	µg/ech. G	<1,00	<1,00		
2-Ethoxyéthanol (A)	µg/ech. G	<1,00	<1,00		
Limonène (A)	µg/ech. G	<1,00	<1,00		
Méthylcyclopentane (A)	µg/ech. G	<1,00	1,00		
2-méthylpentane (A)	µg/ech. G	<1,00	1,00		
1-pentyl acétate (A)	µg/ech. G	<1,00	<1,00		
3-méthylpentane (A)	µg/ech. G	<1,00	2,00		
2- Méthoxyéthyl acetate (A)	µg/ech. G	<1,00	<1,00		
Decane (A)	µg/Probe G	<1	<1		

G : Gaz





Le 12.10.2020

N° d'échantillon

20-154033-01

20-154033-02

Désignation d'échantillon

Unité

*BENP*  
*190008\_AIR\_01*

*BENP*  
*190008\_AIR\_02*

## Informations sur les échantillons

Date de réception :	29.09.2020	29.09.2020		
Type d'échantillon :	<i>Air ambient</i>	<i>Air ambient</i>		
Récipient :	1 Radiello 130, 1 Radiello 170, 2*1 Radiello 166, 1 Radiello 172.	1 Radiello 130, 1 Radiello 170, 2*1 Radiello 166, 1 Radiello 172.		
Température à réception (C°) :	15.5	15.5		
Début des analyses :	29.09.2020	29.09.2020		
Fin des analyses :	09.10.2020	09.10.2020		



Le 12.10.2020

## Commentaires sur vos résultats d'analyse :

Les résultats fournis et les limites de quantification indiquées ne prennent pas en compte le rendement de désorption du support.

Les seuils sont susceptibles d'être augmentés en fonction d'interférences chimiques.

Les résultats des échantillons reçus à une température supérieure à 8°C, sont rendus avec réserve.

Signataire rédacteur :

**Yann LAFOND**

Chargé de Clientèle



Signataire approbateur :

**Jean-François CAMPENS**

Gérant



**WESSLING**

Quality of Life

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**ANTEA GROUP**  
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N° rapport d'essai	ULY20-018698-1
N° commande	ULY-16635-20
Interlocuteur (interne)	Y. Lafond
Téléphone	+33 474 990 554
Courrier électronique	y.lafond@wessling.fr
Date	05.10.2020

## Rapport d'essai

***BENP 190008***



Les résultats ne se rapportent qu'aux échantillons soumis à l'essai et tels qu'ils ont été reçus.

Les paramètres couverts par l'accréditation EN ISO/CEI 17025 sont marqués d'un (A) et leurs résultats sont accrédités sauf avis contraire en remarque.

La portée d'accréditation COFRAC n°1-1364 essais du laboratoire WESSLING de Lyon (St Quentin Fallavier) est disponible sur le site [www.cofrac.fr](http://www.cofrac.fr) pour les résultats accrédités par ce laboratoire.

Ce rapport d'essai ne peut être reproduit que sous son intégralité et avec l'autorisation des laboratoires WESSLING.

Les laboratoires WESSLING autorisent leurs clients à extraire tout ou partie des résultats d'essai envoyés à titre indicatif sous format excel uniquement à des fins de retraitement, de suivi et d'interprétation de données sans faire allusion à l'accréditation des résultats d'essai.

Les données fournies par le client sont sous sa responsabilité et identifiées en italique.



Le 05.10.2020

N° d'échantillon		20-154009-01	20-154009-02	20-154009-03	20-154009-04
Désignation d'échantillon	Unité	BENP 190008_GW_01 (1/3, 2/3, 3/3)	BENP 190008_GW_02 (1/3, 2/3, 3/3)	BENP 190008_GW_03 (1/3, 2/3, 3/3)	BENP 190008_GW_04 (1/3, 2/3, 3/3)

## Paramètres globaux / Indices

Indice hydrocarbures (GC) sur eau / lixiviat (HCT) - NF EN ISO 9377-2 - Réalisé par WESSLING Lyon (France)

Indice hydrocarbure C10-C40 (A)	mg/l E/L	<0,05	<0,05	<0,05	<0,05
Hydrocarbures > C10-C12	mg/l E/L	<0,05	<0,05	<0,05	<0,05
Hydrocarbures > C12-C16	mg/l E/L	<0,05	<0,05	<0,05	<0,05
Hydrocarbures > C16-C21	mg/l E/L	<0,05	<0,05	<0,05	<0,05
Hydrocarbures > C21-C35	mg/l E/L	<0,05	<0,05	<0,05	<0,05
Hydrocarbures > C35-C40	mg/l E/L	<0,05	<0,05	<0,05	<0,05

## Éléments

Métaux sur eau / lixiviat (ICP-MS) - NF EN ISO 17294-2 - Réalisé par WESSLING Lyon (France)

Chrome (Cr) total (A)	µg/l E/L	<5,0	<5,0	<5,0	<5,0
Nickel (Ni) (A)	µg/l E/L	<10	<10	<10	<10
Cuivre (Cu) (A)	µg/l E/L	<5,0	48	41	83
Zinc (Zn) (A)	µg/l E/L	<50	<50	<50	130
Arsenic (As) (A)	µg/l E/L	<3,0	<3,0	<3,0	<3,0
Cadmium (Cd) (A)	µg/l E/L	<1,5	<1,5	<1,5	<1,5
Plomb (Pb) (A)	µg/l E/L	<10	<10	<10	37

Métaux sur eau / lixiviat (ICP-MS) - NF EN ISO 17294-2 - Réalisé par WESSLING Lyon (France)

Mercure (Hg) (A)	µg/l E/L	<0,1	<0,1	<0,1	<0,1
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E/L : Eau/lixiviat

## Informations sur les échantillons

Date de réception :	29.09.2020	29.09.2020	29.09.2020	29.09.2020
Type d'échantillon :	Eau propre	Eau propre	Eau propre	Eau propre
Date de prélèvement :	23.09.2020	23.09.2020	23.09.2020	23.09.2020
Récipient :	2*250ml Verre WES020+100ml PE WES100	2*250ml Verre WES020+100ml PE WES100	2*250ml Verre WES020+100ml PE WES100	2*250ml Verre WES020+100ml PE WES100
Température à réception (C°) :	11.4	11.4	11.4	11.4
Début des analyses :	29.09.2020	29.09.2020	29.09.2020	29.09.2020
Fin des analyses :	05.10.2020	05.10.2020	05.10.2020	05.10.2020



Le 05.10.2020

N° d'échantillon

20-154009-05

20-154009-06

Désignation d'échantillon

Unité

**BENP**  
**190008\_GW\_05**  
**(1/3, 2/3, 3/3)**

**BENP**  
**190008\_GW\_06**  
**(1/3, 2/3, 3/3)**

## Paramètres globaux / Indices

Indice hydrocarbures (GC) sur eau / lixiviat (HCT) - NF EN ISO 9377-2 - Réalisé par WESSLING Lyon (France)

Indice hydrocarbure C10-C40 (A)	mg/l E/L	<0,16	<0,05		
Hydrocarbures > C10-C12	mg/l E/L	<0,16	<0,05		
Hydrocarbures > C12-C16	mg/l E/L	<0,16	<0,05		
Hydrocarbures > C16-C21	mg/l E/L	<0,16	<0,05		
Hydrocarbures > C21-C35	mg/l E/L	<0,16	<0,05		
Hydrocarbures > C35-C40	mg/l E/L	<0,16	<0,05		

## Éléments

Métaux sur eau / lixiviat (ICP-MS) - NF EN ISO 17294-2 - Réalisé par WESSLING Lyon (France)

Chrome (Cr) total (A)	µg/l E/L	<5,0	<5,0		
Nickel (Ni) (A)	µg/l E/L	<10	<10		
Cuivre (Cu) (A)	µg/l E/L	75	12		
Zinc (Zn) (A)	µg/l E/L	100	<50		
Arsenic (As) (A)	µg/l E/L	<3,0	<3,0		
Cadmium (Cd) (A)	µg/l E/L	<1,5	<1,5		
Plomb (Pb) (A)	µg/l E/L	<10	<10		

Métaux sur eau / lixiviat (ICP-MS) - NF EN ISO 17294-2 - Réalisé par WESSLING Lyon (France)

Mercure (Hg) (A)	µg/l E/L	<0,1	<0,1		
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E/L : Eau/lixiviat

## Informations sur les échantillons

Date de réception :	29.09.2020	29.09.2020		
Type d'échantillon :	Eau propre	Eau propre		
Date de prélèvement :	23.09.2020	23.09.2020		
Récipient :	2*250ml Verre WES020+100ml PE WES100	2*250ml Verre WES020+100ml PE WES100		
Température à réception (C°) :	11.4	11.4		
Début des analyses :	29.09.2020	29.09.2020		
Fin des analyses :	05.10.2020	05.10.2020		



Le 05.10.2020

**Commentaires sur vos résultats d'analyse :**

Pour parfaire la lecture de vos résultats, les seuils sont susceptibles d'être augmentés en fonction de la nature chimique de la matrice. Les métaux réalisés après minéralisation sont les éléments totaux. Sans minéralisation, il s'agit des éléments dissous.

Les résultats des échantillons reçus à une température supérieure à 8°C, sont rendus avec réserve.

20-154009-01

Commentaires des résultats:

HCT GC-FID (E/L), Indice hydrocarbure C10-C40: Résultat sous réserve : Pour effectuer l'extraction dans le flacon d'origine, un retrait d'une partie de la phase aqueuse a été nécessaire. Ce retrait a pu engendrer un sous dosage de l'échantillon. L'extraction réalisée sur le contrôle interne d'eau dopée n'est pas incluse dans les exigences de la méthode.

Métaux (E/L), Chrome (Cr) total: Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Nickel (Ni): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Cuivre (Cu): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Zinc (Zn): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Arsenic (As): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Cadmium (Cd): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Plomb (Pb): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L) (Hg,Ti,Fe), Mercure (Hg): Résultat sous réserve : Flaconnage non-conforme.

20-154009-02

Commentaires des résultats:

HCT GC-FID (E/L), Indice hydrocarbure C10-C40: Résultat sous réserve : Pour effectuer l'extraction dans le flacon d'origine, un retrait d'une partie de la phase aqueuse a été nécessaire. Ce retrait a pu engendrer un sous dosage de l'échantillon. L'extraction réalisée sur le contrôle interne d'eau dopée n'est pas incluse dans les exigences de la méthode.

Métaux (E/L), Chrome (Cr) total: Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Nickel (Ni): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Cuivre (Cu): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Zinc (Zn): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Arsenic (As): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Cadmium (Cd): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Plomb (Pb): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L) (Hg,Ti,Fe), Mercure (Hg): Résultat sous réserve : Flaconnage non-conforme.

20-154009-03

Commentaires des résultats:

HCT GC-FID (E/L), Indice hydrocarbure C10-C40: Résultat sous réserve : Pour effectuer l'extraction dans le flacon d'origine, un retrait d'une partie de la phase aqueuse a été nécessaire. Ce retrait a pu engendrer un sous dosage de l'échantillon. L'extraction réalisée sur le contrôle interne d'eau dopée n'est pas incluse dans les exigences de la méthode.

Métaux (E/L), Chrome (Cr) total: Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Nickel (Ni): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Cuivre (Cu): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Zinc (Zn): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Arsenic (As): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Cadmium (Cd): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Plomb (Pb): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L) (Hg,Ti,Fe), Mercure (Hg): Résultat sous réserve : Flaconnage non-conforme.

20-154009-04

Commentaires des résultats:

HCT GC-FID (E/L), Indice hydrocarbure C10-C40: Résultat sous réserve : Pour effectuer l'extraction dans le flacon d'origine, un retrait d'une partie de la phase aqueuse a été nécessaire. Ce retrait a pu engendrer un sous dosage de l'échantillon. L'extraction réalisée sur le contrôle interne d'eau dopée n'est pas incluse dans les exigences de la méthode.

Métaux (E/L), Chrome (Cr) total: Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Nickel (Ni): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Cuivre (Cu): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Zinc (Zn): Résultat sous réserve : Flaconnage non-conforme.

Résultat hors champ d'accréditation car situé hors du domaine de calibration

Métaux (E/L), Arsenic (As): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Cadmium (Cd): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Plomb (Pb): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L) (Hg,Ti,Fe), Mercure (Hg): Résultat sous réserve : Flaconnage non-conforme.

20-154009-05

Commentaires des résultats:

HCT GC-FID (E/L), Indice hydrocarbure C10-C40: Résultat sous réserve : Pour effectuer l'extraction dans le flacon d'origine, un retrait d'une partie de la phase aqueuse a été nécessaire. Ce retrait a pu engendrer un sous dosage de l'échantillon. L'extraction réalisée sur le contrôle interne d'eau dopée n'est pas incluse dans les exigences de la méthode. Seuil de quantification augmenté dû à des interférences en raison de l'absence d'opercule dans le bouchon du flacon reçu.

Métaux (E/L), Chrome (Cr) total: Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Nickel (Ni): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Cuivre (Cu): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Zinc (Zn): Résultat sous réserve : Flaconnage non-conforme.





## Le 05.10.2020

Résultat hors champ d'accréditation car situé hors du domaine de calibration

Métaux (E/L), Arsenic (As): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Cadmium (Cd): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Plomb (Pb): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L) (Hg,Ti,Fe), Mercure (Hg): Résultat sous réserve : Flaconnage non-conforme.

20-154009-06

Commentaires des résultats:

HCT GC-FID (E/L), Indice hydrocarbure C10-C40: Résultat sous réserve : Pour effectuer l'extraction dans le flacon d'origine, un retrait d'une partie de la phase aqueuse a été nécessaire. Ce retrait a pu engendrer un sous dosage de l'échantillon. L'extraction réalisée sur le contrôle interne d'eau dopée n'est pas incluse dans les exigences de la méthode.

Métaux (E/L), Chrome (Cr) total: Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Nickel (Ni): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Cuivre (Cu): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Zinc (Zn): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Arsenic (As): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Cadmium (Cd): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L), Plomb (Pb): Résultat sous réserve : Flaconnage non-conforme.

Métaux (E/L) (Hg,Ti,Fe), Mercure (Hg): Résultat sous réserve : Flaconnage non-conforme.

Signataire rédacteur :

**Yann LAFOND**

Chargé de Clientèle

Signataire approbateur :

**DECOT Sophie**

Responsable Service Enregistrement

**WESSLING**

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N° rapport d'essai	ULY20-019116-1
N° commande	ULY-16635-20
Interlocuteur (interne)	Y. Lafond
Téléphone	+33 474 990 554
Courrier électronique	y.lafond@wessling.fr
Date	09.10.2020

## Rapport d'essai

***BENP 190008***



Les résultats ne se rapportent qu'aux échantillons soumis à l'essai et tels qu'ils ont été reçus.

Les paramètres couverts par l'accréditation EN ISO/CEI 17025 sont marqués d'un (A) et leurs résultats sont accrédités sauf avis contraire en remarque.

La portée d'accréditation COFRAC n°1-1364 essais du laboratoire WESSLING de Lyon (St Quentin Fallavier) est disponible sur le site [www.cofrac.fr](http://www.cofrac.fr) pour les résultats accrédités par ce laboratoire.

La portée d'accréditation DAKKS n° D-PL-14162-01-00 des laboratoires WESSLING Allemands est disponible sur le site [www.dakks.de](http://www.dakks.de) pour les résultats accrédités par ces laboratoires.

Ce rapport d'essai ne peut être reproduit que sous son intégralité et avec l'autorisation des laboratoires WESSLING.

Les laboratoires WESSLING autorisent leurs clients à extraire tout ou partie des résultats d'essai envoyés à titre indicatif sous format excel uniquement à des fins de retraitement, de suivi et d'interprétation de données sans faire allusion à l'accréditation des résultats d'essai.

Les données fournies par le client sont sous sa responsabilité et identifiées en italique.



Le 09.10.2020

N° d'échantillon		20-154022-01	20-154022-02	20-154022-03	20-154022-04
Désignation d'échantillon	Unité	BENP 190008_Soil_01 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_02 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_03 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_04 (1/4, 2/4, 3/4, 4/4)

## Analyse physique

Matières sèches - NF ISO 11465 - Réalisé par WESSLING Lyon (France)

Matière sèche (A)	% mass MB	84,1	85,0	84,8	87,7
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## Paramètres globaux / Indices

Indice Hydrocarbures (C10-C40) (Agitation mécanique, purification au fluorisil) - NF EN ISO 16703 - Réalisé par WESSLING Lyon (France)

Indice hydrocarbure C10-C40 (A)	mg/kg MS	<20	<20	<20	<20
Hydrocarbures > C10-C12	mg/kg MS	<20	<20	<20	<20
Hydrocarbures > C12-C16	mg/kg MS	<20	<20	<20	<20
Hydrocarbures > C16-C21	mg/kg MS	<20	<20	<20	<20
Hydrocarbures > C21-C35	mg/kg MS	<20	<20	<20	<20
Hydrocarbures > C35-C40	mg/kg MS	<20	<20	<20	<20

## Métaux lourds

Métaux - Méth. interne : "ICP-MS NF EN ISO 17294-2" - Réalisé par WESSLING Lyon (France)

Chrome (Cr) total (A)	mg/kg MS	73	30	43	38
Nickel (Ni) (A)	mg/kg MS	7,0	8,0	9,0	6,0
Cuivre (Cu) (A)	mg/kg MS	14	25	14	9,0
Zinc (Zn) (A)	mg/kg MS	16	15	14	10
Arsenic (As) (A)	mg/kg MS	3,0	<2,0	2,0	<2,0
Cadmium (Cd) (A)	mg/kg MS	<0,5	<0,5	<0,5	<0,5
Mercure (Hg) (A)	mg/kg MS	<0,1	<0,1	<0,1	<0,1
Plomb (Pb) (A)	mg/kg MS	13	15	13	<10

## Hydrocarbures chlorés semi-volatils

Pesticides organochlorés - Méth. interne : "ChloroB lourds NF EN ISO 6468 / NF ISO 10382" - Réalisé par WESSLING Lyon (France)

Aldrine (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
o,p'-DDD (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
p,p'-DDD (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
o,p'-DDE (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
p,p'-DDE (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
Dieldrine (A)	mg/kg MS	<0,16	<0,16	<0,16	<0,15
alpha-Hexachlorocyclohexane (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
beta-Hexachlorocyclohexane (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
gamma-Hexachlorocyclohexane (Lindane) (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
delta-Hexachlorocyclohexane (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
epsilon-Hexachlorocyclohexane (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06

## Chlorobenzènes légers

Chlorobenzènes volatils - Méth. Int. : "ChloroB NF EN ISO 22155 / NF ISO 11423-1" - Réalisé par WESSLING Lyon (France)

1,2,3-Trichlorobenzène (A)	mg/kg MS	<0,1	<0,1	<0,1	<0,1
Somme des chlorobenzènes	mg/kg MS	-/-	-/-	-/-	-/-

## Préparation d'échantillon



Le 09.10.2020

N° d'échantillon		20-154022-01	20-154022-02	20-154022-03	20-154022-04
		<i>BENP</i>	<i>BENP</i>	<i>BENP</i>	<i>BENP</i>
Désignation d'échantillon	Unité	190008_Soil_01 (1/4, 2/4, 3/4, 4/4)	190008_Soil_02 (1/4, 2/4, 3/4, 4/4)	190008_Soil_03 (1/4, 2/4, 3/4, 4/4)	190008_Soil_04 (1/4, 2/4, 3/4, 4/4)

Minéralisation à l'eau régale - Méth. interne : " MINE NF ISO 11466" - Réalisé par WESSLING Lyon (France)

Minéralisation à l'eau régale (A)	MS	05/10/2020	05/10/2020	05/10/2020	05/10/2020
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## Pesticides extractibles à pH 2

Pesticides sur sol (pH 2) - DIN ISO 11264 mod. (2005-11) - Réalisé par WESSLING Altenberge (Allemagne)

2,4-D (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
2,4,5-T (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
2,4-DB (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Bentazone (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Bromoxynil (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Clopyralide (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Dicamba (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Dichloroprop (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Ioxynil (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
MCPA (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
MCPB (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Mecoprop (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Piclorame (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metsulfuron-méthyl (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metosulam (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01



Le 09.10.2020

N° d'échantillon		20-154022-01	20-154022-02	20-154022-03	20-154022-04
Désignation d'échantillon	Unité	BENP 190008_Soil_01 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_02 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_03 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_04 (1/4, 2/4, 3/4, 4/4)

## Pesticides extractibles à pH 7

Pesticides sur matière solide (pH 7) - DIN ISO 11264 mod. (2005-11) - Réalisé par WESSLING Altenberge (Allemagne)

Alachlore (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Aldicarbe (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Amétryne (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Atrazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Azinphos-éthyl (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Bifenox (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Bromacil (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Buturon (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Carbaryl (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Carbetamide (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Carbofurane (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Chlorfenvinphos (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Chloridazone (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Chloroxuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Chlorotoluron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Crimidine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Cyanazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Deséthylatrazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Deséthylterbutylazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Desisopropylatrazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Desmétryne (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Diazinone (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
2,6-Dichlorobenzamide (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Diflurbenzuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Dimefuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Diméthoate (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Diuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Ethidimuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Ethofumesate (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Fenuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Flazasulfuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Hexazinon (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Isoproturon (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Lenacil (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Linuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metalaxyl (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metamitron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metazachlor (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Methabenzthiazuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metobromuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metolachlor (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metoxuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metribuzine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Monolinuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Monuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Napropamide (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Pendimethaline (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Prometryne (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01



Le 09.10.2020

N° d'échantillon		20-154022-01	20-154022-02	20-154022-03	20-154022-04
Désignation d'échantillon	Unité	BENP 190008_Soil_01 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_02 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_03 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_04 (1/4, 2/4, 3/4, 4/4)

Propazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Propoxur (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Propyzamide (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Sebutylazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Simazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Tebutam (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Terbutryne (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Terbutylazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Triadimenol (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01

MS : Matières sèches  
MB : Matières brutes

## Informations sur les échantillons

Date de réception :	29.09.2020	29.09.2020	29.09.2020	29.09.2020
Type d'échantillon :	Sol	Sol	Sol	Sol
Date de prélèvement :	21.09.2020	21.09.2020	21.09.2020	21.09.2020
Récipient :	4*250ml VBrun WES002	4*250ml VBrun WES002	4*250ml VBrun WES002	4*250ml VBrun WES002
Température à réception (C°) :	16.4	16.4	16.4	16.4
Début des analyses :	29.09.2020	29.09.2020	29.09.2020	29.09.2020
Fin des analyses :	09.10.2020	09.10.2020	09.10.2020	09.10.2020





Le 09.10.2020

N° d'échantillon		20-154022-05	20-154022-06	20-154022-07	20-154022-08
Désignation d'échantillon	Unité	<i>BENP</i> <i>190008_Soil_05</i> <i>(1/4, 2/4, 3/4, 4/4)</i>	<i>BENP</i> <i>190008_Soil_06</i> <i>(1/4, 2/4, 3/4, 4/4)</i>	<i>BENP</i> <i>190008_Soil_07</i> <i>(1/4, 2/4, 3/4, 4/4)</i>	<i>BENP</i> <i>190008_Soil_08</i> <i>(1/4, 2/4, 3/4, 4/4)</i>

## Analyse physique

Matières sèches - NF ISO 11465 - Réalisé par WESSLING Lyon (France)

Matière sèche (A)	% mass MB	84,6	85,4	86,2	87,8
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## Paramètres globaux / Indices

Indice Hydrocarbures (C10-C40) (Agitation mécanique, purification au fluorisil) - NF EN ISO 16703 - Réalisé par WESSLING Lyon (France)

Indice hydrocarbure C10-C40 (A)	mg/kg MS	<20	<20	<20	<20
Hydrocarbures > C10-C12	mg/kg MS	<20	<20	<20	<20
Hydrocarbures > C12-C16	mg/kg MS	<20	<20	<20	<20
Hydrocarbures > C16-C21	mg/kg MS	<20	<20	<20	<20
Hydrocarbures > C21-C35	mg/kg MS	<20	<20	<20	<20
Hydrocarbures > C35-C40	mg/kg MS	<20	<20	<20	<20

## Métaux lourds

Métaux - Méth. interne : "ICP-MS NF EN ISO 17294-2" - Réalisé par WESSLING Lyon (France)

Chrome (Cr) total (A)	mg/kg MS	50	53	37	31
Nickel (Ni) (A)	mg/kg MS	6,0	8,0	6,0	4,0
Cuivre (Cu) (A)	mg/kg MS	14	15	10	6,0
Zinc (Zn) (A)	mg/kg MS	12	15	12	9,0
Arsenic (As) (A)	mg/kg MS	<2,0	2,0	2,0	<2,0
Cadmium (Cd) (A)	mg/kg MS	<0,5	<0,5	<0,5	<0,5
Mercurie (Hg) (A)	mg/kg MS	<0,1	<0,1	<0,1	<0,1
Plomb (Pb) (A)	mg/kg MS	10	13	<10	<10

## Hydrocarbures chlorés semi-volatils

Pesticides organochlorés - Méth. interne : "ChloroB lourds NF EN ISO 6468 / NF ISO 10382" - Réalisé par WESSLING Lyon (France)

Aldrine (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
o,p'-DDD (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
p,p'-DDD (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
o,p'-DDE (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
p,p'-DDE (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
Dieldrine (A)	mg/kg MS	<0,16	<0,16	<0,15	<0,15
alpha-Hexachlorocyclohexane (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
beta-Hexachlorocyclohexane (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
gamma-Hexachlorocyclohexane (Lindane) (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
delta-Hexachlorocyclohexane (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06
epsilon-Hexachlorocyclohexane (A)	mg/kg MS	<0,06	<0,06	<0,06	<0,06

## Chlorobenzènes légers

Chlorobenzènes volatils - Méth. Int. : "ChloroB NF EN ISO 22155 / NF ISO 11423-1" - Réalisé par WESSLING Lyon (France)

1,2,3-Trichlorobenzène (A)	mg/kg MS	<0,1	<0,1	<0,1	<0,1
Somme des chlorobenzènes	mg/kg MS	-/-	-/-	-/-	-/-

## Préparation d'échantillon



Le 09.10.2020

N° d'échantillon		20-154022-05	20-154022-06	20-154022-07	20-154022-08
		<i>BENP</i>	<i>BENP</i>	<i>BENP</i>	<i>BENP</i>
Désignation d'échantillon	Unité	190008_Soil_05 (1/4, 2/4, 3/4, 4/4)	190008_Soil_06 (1/4, 2/4, 3/4, 4/4)	190008_Soil_07 (1/4, 2/4, 3/4, 4/4)	190008_Soil_08 (1/4, 2/4, 3/4, 4/4)

Minéralisation à l'eau régale - Méth. interne : " MINE NF ISO 11466" - Réalisé par WESSLING Lyon (France)

Minéralisation à l'eau régale (A)	MS	05/10/2020	05/10/2020	05/10/2020	05/10/2020
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## Pesticides extractibles à pH 2

Pesticides sur sol (pH 2) - DIN ISO 11264 mod. (2005-11) - Réalisé par WESSLING Altenberge (Allemagne)

2,4-D (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
2,4,5-T (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
2,4-DB (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Bentazone (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Bromoxynil (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Clopyralide (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Dicamba (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Dichloroprop (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Ioxynil (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
MCPA (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
MCPB (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Mecoprop (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Piclorame (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metsulfuron-méthyl (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metosulam (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01



Le 09.10.2020

N° d'échantillon		20-154022-05	20-154022-06	20-154022-07	20-154022-08
Désignation d'échantillon	Unité	BENP 190008_Soil_05 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_06 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_07 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_08 (1/4, 2/4, 3/4, 4/4)

## Pesticides extractibles à pH 7

Pesticides sur matière solide (pH 7) - DIN ISO 11264 mod. (2005-11) - Réalisé par WESSLING Altenberge (Allemagne)

Alachlore (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Aldicarbe (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Amétryne (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Atrazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Azinphos-éthyl (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Bifenox (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Bromacil (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Buturon (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Carbaryl (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Carbetamide (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Carbofurane (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Chlorfenvinphos (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Chloridazone (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Chloroxuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Chlorotoluron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Crimidine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Cyanazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Deséthylatrazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Deséthylterbutylazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Desisopropylatrazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Desmétryne (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Diazinone (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
2,6-Dichlorobenzamide (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Diflufenzuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Dimefuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Diméthoate (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Diuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Ethidimuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Ethofumesate (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Fenuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Flazasulfuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Hexazinon (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Isoproturon (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Lenacil (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Linuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metalaxyl (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metamitron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metazachlor (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Methabenzthiazuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metobromuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metolachlor (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metoxuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Metribuzine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Monolinuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Monuron (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Napropamide (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Pendimethaline (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Prometryne (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01



Le 09.10.2020

N° d'échantillon		20-154022-05	20-154022-06	20-154022-07	20-154022-08
Désignation d'échantillon	Unité	BENP 190008_Soil_05 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_06 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_07 (1/4, 2/4, 3/4, 4/4)	BENP 190008_Soil_08 (1/4, 2/4, 3/4, 4/4)

Propazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Propoxur (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Propyzamide (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Sebutylazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Simazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Tebutam (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Terbutryne (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Terbutylazine (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01
Triadimenol (A)	mg/kg MB	<0,01	<0,01	<0,01	<0,01

MS : Matières sèches  
MB : Matières brutes

## Informations sur les échantillons

Date de réception :	29.09.2020	29.09.2020	29.09.2020	29.09.2020
Type d'échantillon :	Sol	Sol	Sol	Sol
Date de prélèvement :	21.09.2020	21.09.2020	21.09.2020	21.09.2020
Récipient :	4*250ml VBrun WES002	4*250ml VBrun WES002	4*250ml VBrun WES002	4*250ml VBrun WES002
Température à réception (C°) :	16.4	16.4	16.4	16.4
Début des analyses :	29.09.2020	29.09.2020	29.09.2020	29.09.2020
Fin des analyses :	09.10.2020	09.10.2020	09.10.2020	09.10.2020



Le 09.10.2020

## Commentaires sur vos résultats d'analyse :

Les seuils de quantification fournis n'ont pas été recalculés d'après la matière sèche de l'échantillon.

Les seuils sont susceptibles d'être augmentés en fonction de la nature chimique de la matrice.

Les résultats des échantillons reçus à une température supérieure à 8°C, sont rendus avec réserve.

20-154022-01

Commentaires des résultats:

Métaux (S), Cuivre (Cu): Résultat hors champ d'accréditation dû à la contamination du blanc de minéralisation

20-154022-02

Commentaires des résultats:

Métaux (S), Cuivre (Cu): Résultat hors champ d'accréditation dû à la contamination du blanc de minéralisation

20-154022-03

Commentaires des résultats:

Métaux (S), Cuivre (Cu): Résultat hors champ d'accréditation dû à la contamination du blanc de minéralisation

20-154022-04

Commentaires des résultats:

Métaux (S), Cuivre (Cu): Résultat hors champ d'accréditation dû à la contamination du blanc de minéralisation

20-154022-05

Commentaires des résultats:

Métaux (S), Cuivre (Cu): Résultat hors champ d'accréditation dû à la contamination du blanc de minéralisation

20-154022-06

Commentaires des résultats:

Métaux (S), Cuivre (Cu): Résultat hors champ d'accréditation dû à la contamination du blanc de minéralisation

20-154022-07

Commentaires des résultats:

Métaux (S), Cuivre (Cu): Résultat hors champ d'accréditation dû à la contamination du blanc de minéralisation

20-154022-08

Commentaires des résultats:

Métaux (S), Cuivre (Cu): Résultat hors champ d'accréditation dû à la contamination du blanc de minéralisation

Signataire rédacteur :

**Yann LAFOND**

Chargé de Clientèle

Signataire approbateur :

**Alexandra CROIZIERS**

Responsable qualité

## Annex IX **List of flora species recorded on the Project site**



Species	Family	Common name	Beninese red list	National regulation	IUCN red list	Observed during Rainy or Dry season
<i>Acacia auriculiformis</i> A. Cunn. ex Benth.	Leg.-Mim.					P
<i>Acacia mangium</i>	Leg.-Mim.	Brown salwood			LC	R
<i>Acalypha ciliata</i>	Euphorbiaceae					D
<i>Agelaea pentagyna</i>	Connaraceae					R
<i>Albizia adianthifolia</i> (Schum.) W.F. Wight	Leg.-Mim.	Albizia	LC	P	LC	R
<i>Albizia zygia</i> (DC.) J.F. Macbr.	Leg.-caes.	Albizia	LC	P	LC	R, D
<i>Alchornea cordifolia</i>	Euphorbiaceae	-			LC	D
<i>Allophylus africanus</i> P. Beauv.	Sapindaceae	-			LC	R, D
<i>Alternanthera brasiliana</i> (L.) Kuntze	Chenopodiaceae					R, D
<i>Alternanthera pungens</i> Kunth	Amaranthaceae					R
<i>Ampelocissus africana</i>	Vitaceae					D
<i>Ananas comosus</i>	Bromeliaceae					R
<i>Antiaris africana</i>	Moraceae					D
<i>Antiaris toxicaria</i> Lesch. Var. <i>africana</i>	Moraceae	Antiaris	LC	P	LC	R
<i>Asparagus africanus</i> Lam.	Liliaceae					R
<i>Asparagus flagellaris</i>	Asparagaceae					D
<i>Azadirachta indica</i>	meliaeae					D
<i>Azadirachta indica</i> A. Juss.	Meliaceae	Neem			LC	R
<i>Baissea zygodioides</i>	Apocynaceae					R
<i>Barteria nigritiana</i> Hook.f.	Passifloraceae					R
<i>Bauhinia rufescens</i>	Fabaceae	-			LC	D
<i>Bidens pilosa</i> L.	Asteraceae					R, D
<i>Brachiaria deflexa</i>	Poaceae					D
<i>Bridelia ferruginea</i> Benth	Euphorbiaceae					R, D
<i>Carissa edulis</i> (Forssk.) Vahl	Apocynaceae					R
<i>carpolobia lutea</i> G. Don	Polygalaceae	-			LC	R
<i>Cassia hirsuta</i>	Fabaceae					D
<i>Cassipourea congoensis</i> R. Br. ex DC.	Rhizophoraceae					R
<i>Ceiba pentandra</i> (L.) Gaert.	Malvaceae	Fromager	LC	P	LC	R, D
<i>Celtis philippensis</i> Blanco Syn. <i>C. brownii</i>	Ulmaceae	-			LC	R
<i>Centrosema pubescens</i> Benth	Leg.-Pap.					R, D
<i>Chassalia kolly</i> (Schmach.) Hepper	Rubiaceae					R, D
<i>Chromolaena odorata</i>	Asteraceae					R, D
<i>Cissus populnea</i> Guill. & Perr.	Vitaceae					R
<i>Clausea anisata</i>	Rutaceae	Horsewood			LC	R, D
<i>Clerodendrum capitatum</i> (Willd.) Schum. & Thonn.	Verbenaceae					R
<i>Cnestis ferruginea</i> Vahl ex DC.	Connaraceae					R, D
<i>Cola millenii</i> K. Schum.	Sterculiaceae					R
<i>Combretum comosum</i> G. Don	Combretaceae					R
<i>Combretum mucronatum</i>	Combretaceae					R
<i>Combretum racemosum</i>	Combretaceae					R
<i>Commelina benghalensis</i> L.	Commelinaceae	Day flower			LC	R
<i>Commelina diffusa</i>	Commelinaceae	Climbing dayflower			LC	D
<i>Croton hirtus</i> L'her	Euphorbiaceae					R, D
<i>Croton lobatus</i>	Euphorbiaceae					D
<i>Culcasia scandens</i> P. Beauv.	Araceae	-			LC	R
<i>Cyclosorus gongiloides</i>	Thelipteridaceae					R
<i>Cyperus iria</i>	Cyperaceae				LC	D
<i>Cyperus rotundus</i> L.	Cyperaceae	Nutgrass			LC	R
<i>Datura sp</i>	Solanaceae					R
<i>Delonix regia</i> (Baj) raf.	Leg.-Caes	Flame tree			LC	R
<i>Desmodium velutinum</i> (Willd.) DC.	Fabaceae					R, D
<i>Dialium guineense</i> Willd.	Fabaceae	Black tamarind	LC	P	LC	R, D
<i>Digitaria horizontalis</i>	Poaceae					D
<i>Dioscorea abyssinica</i> Hochst	Dioscoreaceae	Dooya			LC	R
<i>Dischrostachys cinera</i>	Leg.-Mimosoideae					D
<i>Discoidea madagascariensis</i>	Discoreaceae					R
<i>Dracaena arborea</i> (Willd.) Link	Dracaenaceae	-			LC	R
<i>Elaeis guineensis</i> Jacq.	Areaceae	African oil palm			LC	R, D
<i>Emilia praetermissa</i>	Asteraceae					D
<i>Euphorbia heterophylla</i>	Euphorbiaceae					R, D
<i>Euphorbia hirta</i> L.	Euphorbiaceae					R, D
<i>Euphorbia hyssopifolia</i> L.	Euphorbiaceae					R
<i>Euphorbia oppositifolius</i>	Euphorbiaceae					D
<i>Ficus exasperata</i> Vahl	Moraceae				LC	R, D
<i>Ficus trichopoda</i> Baker (hongbede)	Moraceae	-			LC	R
<i>Flacourtia indica</i>	Salicaceae					D
<i>Flueggea virosa</i> (Roxb. ex Willd.) Voigt	Euphorbiaceae	-			LC	R, D
<i>Gmelina arborea</i> Roxb.	Verbenaceae	-			LC	R, D
<i>Gymnema sylvestre</i> (Retz.)	Apocynaceae					R
<i>Hibiscus asper</i>	Malvaceae					D
<i>Holarrhena floribunda</i> (G. Don) Dur. et Schinz	Apocynaceae	-			LC	R
<i>Hypoestes forsskaalii</i>	Acanthaceae					D
<i>Icacina senegalensis</i> A. Juss	icacinaceae					R
<i>Icacina trichantha</i> Oliv.	icacinaceae					R
<i>Imperata cylindrica</i>	Poaceae	Coton grass			LC	D
<i>Indigofera hirsuta</i>	Fabaceae					D
<i>Ipomea involucreta</i>	Convolvulaceae					D
<i>Ipomoea mauritiana</i> Jacq.	Convolvulaceae					R, D
<i>Khaya senegalensis</i>	Meliaceae	Caillédrat	EN	P	VU	D
<i>Lecaniodiscus cupanioides</i> Planch.	Sapindaceae					R
<i>Leucaena leucocephala</i> Benth.	Mimosaceae					R, D
<i>Lonchocarpus cyanescens</i>	Fabaceae					R, D
<i>Macrosphyra longistyla</i> (DC.) Hiern	Rubiaceae					R, D
<i>Malacantha alnifolia</i>	Sapotaceae					D
<i>Mallotus oppositifolius</i> (Geisl.) Müll. Arg.	Euphorbiaceae					R, D
<i>Mangifera indica</i> L.	Anacardiaceae	-			DD	R, D
<i>Manihot esculenta</i> Crantz	Euphorbiaceae				DD	R
<i>Margaritaria discoidea</i> (Baill.) G.L.	Phyllanthaceae	-			LC	R
<i>Melanthera scandens</i>	Asteraceae					D
<i>Memecylon afzelli</i> G. Don var. <i>afzelli</i>	Melastomataceae	-			LC	R
<i>Mezoneuron benthamianum</i>	Fabaceae					D
<i>Milicia excelsa</i>	Moraceae	Ioko	EN	P	NT	D
<i>Mimosa pigra</i> L.	Leg.-Mim	-			LC	R
<i>Mitracarpus hirtus</i>	Rubiaceae					D
<i>Mitracarpus villosus</i> (Sw.) DC.	Rubiaceae					R, D

Species	Family	Common name	Beninese red list	National regulation	IUCN red list	Observed during Rainy or Dry season
<i>Momordica charantia</i> L.	Cucurbitaceae					R
<i>Morinda lucida</i> Benth	Rubiaceae					R, D
<i>Neostachyanthus occidentalis</i> Keay & J. Miège	Iringiaceae					R
<i>Newbouldia laevis</i>	Bignoniaceae					D
<i>Ocimum gratissimum</i> L.	Lamiaceae					R, D
<i>Ola subscorpioidea</i> var.	Olaaceae					R, D
<i>Olyra latifolia</i>	Poaceae					R
<i>Ouratea glaberrima</i> (P. Beauv.)	Ochnaceae					R
<i>Panicum maximum</i> Jacq.	Poaceae					R, D
<i>Paspalum orbiculare</i>	Poaceae					D
<i>Passiflora foetida</i>	Passifloraceae					D
<i>Paullinia pinnata</i> L.	Sapindaceae					R, D
<i>Pavetta corymbosa</i> (DC) F.N. Williams	Rubiaceae	-			LC	R
<i>Phyllanthus amarus</i> Schum. & Thonn.	Euphorbiaceae					R, D
<i>Platostoma africanum</i> P. Beauv.	Lamiaceae					R
<i>Pouchetia africana</i> A.Rich	Rubiaceae					R
<i>Pouteria alnifolia</i> (Bak.) Pierre	Sapotaceae	-		P	VU	R
<i>Psychotria calva</i> Hiern	Rubiaceae					R
<i>Psychotria vogeliana</i> Benth.	Rubiaceae					R
<i>Rauvolfia vomitoria</i> Afzel.	Apocynaceae	Poison devil's pepper	NT	P	LC	R, D
<i>Reissantia indica</i>	Hippocrateaceae					R, D
<i>Rhus natalensis</i>	Anacardiaceae	-			LC	R
<i>Richardia brasiliensis</i>	Rubiaceae					D
<i>Rothmannia longiflora</i> Salisb.	Rubiaceae					R
<i>Rottboellia cochinchinensis</i>	Poaceae					D
<i>Rourea coccinea</i> (Thonn. ex Schum.) Benth.	Connaraceae					R, D
<i>Salacia cornifolia</i> Hook. f.	Celastraceae					R
<i>Schwenkia americana</i>	Solanaceae					D
<i>Secomone afzelii</i>	Asclepiadaceae					D
<i>Sena hirsuta</i> (L.)	Leg-Caes					R
<i>Setaria barbata</i> (Lam.) Kunth	Poaceae					R, D
<i>Sida limifolia</i>	Malvaceae					D
<i>Smilax kraussiana</i>	Smilacaceae					D
<i>Solenostemon monostachyus</i>	Lamiaceae					D
<i>Sorindeia grandifolia</i>	Anacardiaceae	-			LC	R
<i>Sorindeia warneckei</i>	Anacardiaceae					D
<i>Spigelia anthelmia</i> L.	Loganiaceae					R, D
<i>Spondias mombin</i> L.	Anacardiaceae	Prunier monbin	LC	P	LC	R
<i>Sporobolus pyramidalis</i> P. Beauv.	Poaceae					R
<i>Stachytarpheta cayennensis</i>	Verbenaceae					D
<i>Stachytarpheta indica</i> (Linn) Vahl.	Verbenaceae					R
<i>Sterculia tragacantha</i>	Malvaceae				LC	D
<i>Strychnos floribunda</i> Gilg	Loganiaceae					R
<i>Talinum triangulare</i>	Talinaceae					D
<i>Talinum triangulare</i> (Jacq.) Willd.	Portulacaceae					R, D
<i>Tectona grandis</i> L. f.	Verbenaceae					R, D
<i>Tephrosia bracteolata</i> Guill. & Perr.	Leg-Fab					R
<i>Tragia senegalensis</i> Mull. Arg	Euphorbiaceae					R
<i>Trichilia emetica</i>	Meliaceae					R, D
<i>Triclisia subcordata</i> Oliv.	Menispermaceae					R, D
<i>Tridax procumbens</i> L.	Asteraceae					R, D
<i>Triplachiton scleroxylon</i> K. Schum.	Sterculiaceae	Samba	EN	P	LC	R
<i>Triumfetta rhomboidea</i> Jacq.	Malvaceae					R, D
<i>Uvaria chamae</i> P. Beauv.	Annonaceae	-			LC	R, D
<i>Vernonia cinerea</i>	Asteraceae					R, D
<i>Waltheria indica</i> L.	Sterculiaceae					R, D
<i>Wissadula rostrata</i>	Malvaceae					D
<i>Zanthoxylum zanthoxyloides</i> (Lam.) Zepernick et Timler	Rutaceae	Fagara jaune	VU	P	LC	R, D
<i>Ziziphus moritiana</i>	Rhamnaceae					R

## Annex X **Permitting list**

## **Procedure for obtaining permits related to environmental protection in Benin**

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# 1. General

The protection of the environment in general and particularly the management of wastewater, the abstraction of groundwater, the production and disposal of waste (special or not) are subject to regulations in the Republic of Benin. Are applicable, among other laws and decrees, the following texts:

- Law No. 87-015 of September 21, 1987 on the Code of Public Hygiene;
- Law No. 2010-44 on water management in the Republic of Benin;
- Law No. 98-030 of February 12, 1999 on the framework law on the environment in the Republic of Benin.

In this document, the various procedures relating to obtaining permits are presented:

- Wastewater / industrial discharge;
- Groundwater abstraction or creation of boreholes;
- Hazardous waste disposal ;
- Management of solid household waste in Grand Nokoué.

This document also contains the stages relating to the management of domestic / industrial wastewater, the stages of waste management, whether they are special, hazardous or not, and finally, the stages of installation of underground water collection works.



## 2. Procedure for obtaining a permit for the discharge of wastewater / industrial in the Republic of Benin

Wastewater discharge authorizations are the prerogatives of the Ministry of the Environment and Sustainable Development.

In the Republic of Benin, it is strictly forbidden to discharge industrial water into storm water drainage gutters (article 3 of decree n ° 2001-109 of April 4, 2001).

Any discharge of wastewater into a receiving environment must comply with the requirements contained in the discharge permit. To obtain the said permit, the applicant must send a written request to the Minister of the Living Environment and Sustainable Development.

This request must include the following information:

- the surname, first name and address of the applicant;
- the type and rates of daily or annual production expected;
- the characteristics of the wastewater (average annual flow, maximum daily flow, maximum instantaneous flow, pH, temperature, concentration and load of contaminant, BOD5, SS, other substances);
- description of the substances or raw materials used, as well as the end products;
- the number of wastewater discharge points and the type of wastewater discharging at each point;
- the characteristics of the wastewater treatment equipment to be installed and their performance;
- the method for eliminating solid residues.

The applicant will then allow a qualified agent duly authorized by the Minister of the Living Environment and Sustainable Development, free access to the sanitation facilities in compliance with the company's safety rules. The applicant will provide the inspection agent with the assistance necessary to carry out the samples or analyzes. The samples taken will be analyzed by an approved laboratory. The results will be recorded in a register with a copy to the Benin Agency for the Environment.

In case of compliance with the wastewater discharge standard according to the industry category, the applicant will receive their wastewater / industrial discharge permit.

There is a fee for obtaining a wastewater / industrial discharge permit. These fees are variable.

The discharge permit is not final. It can be suspended or revoked at any time in the event of non-compliance with the provisions of decree n°2001-109 of April 4, 2001.

### Domestic water discharge

In the Republic of Benin, domestic wastewater can only be discharged into the natural environment after having undergone appropriate treatment, so as to avoid pollution of underground water tables and fresh, estuarine and marine waters.

The operator of a wastewater treatment system is required to obtain an operating permit from the Minister of Living Environment and Sustainable Development.

If the equivalent population is greater than 2,000, the operator provides technical information relating to:

- the characteristics of the wastewater (population and / or connected industries, average annual flow, maximum daily flow, concentrations and load of contaminant);
- an updated and dated plan of the sewer network and the precise location of the discharge points;
- the number of wastewater discharge points;
- the characteristics of the wastewater treatment equipment to be installed and their expected performance;
- the planned disposal method for solid residues from wastewater treatment (residual sludge).

#### Types of domestic / industrial wastewater treatment before discharge

Before discharging wastewater into the receptacle provided for this purpose, the holder of the discharge permit is required to proceed with the treatment of this water. There are several types of wastewater treatment. Each type of contaminant has an effective treatment strategy. Here are some contaminant removal strategies.

- Treatment of brine;
- Removal of solids;
- Elimination of oils and fats;
- Removal of biodegradable organic matter;
- Removal of non-biodegradable organic materials (solvents, paints, pharmaceuticals, pesticides);
- Removal of acids and alkalis;
- Removal of toxic materials.

### 3.Procedure for obtaining a Permit to withdraw groundwater or create a borehole in the Republic of Benin

The abstraction of groundwater or the creation of wells in the Republic of Benin is governed by Law No. 2010-44 on water management in the Republic of Benin and its implementing decree No. 2015-578 of November 18, 2015 on the authorization or declaration procedure for installations, works, works and activities relating to water.

Any applicant for a permit to carry out a groundwater withdrawal work must send his stamped application to the competent authority within the jurisdiction of the place of construction (Article 3 of the decree).

If the applicant intends to carry out the work in a single municipality, he must address the request to the Mayor of the municipality in question. But if it is more than one municipality, the request for authorization is sent to all the mayors concerned (article 4).

When the operation is carried out in several departments, the request is sent both to the Mayors concerned and to the Prefect of the department where the greater part of the operation is to be carried out. The Prefect coordinates the procedure (article 5).

The applicant sends only one request for authorization to the competent authority when it comes to several works on a single site belonging to the property of the single permit applicant.

The request is accompanied by a complete file comprising, in ten (10) copies each:

- a technical file which describes the nature, consistency, volume and purpose of the structure, installation, works or activity envisaged, including the various plans (location and geographical extension, technical diagram), as well as the heading (s) of the nomenclature in which they must be placed;
- an additional document analyzing the impact of the project on water resources, the aquatic environment, flow, water level and quality, including runoff, as well as on the objectives assigned to the management of the water as defined by law n°2010-44 of 24 November 2010 on water management in the Republic of Benin.

Said additional document also specifies the additional measures or water development and management, the means of monitoring provided as well as the means of intervention, in the event of an incident or accident.

It should also be noted that all the documents constituting the application file relate to all the installations or equipment operated or planned by the applicant and which are likely to affect the water or the aquatic environment.

When the file is incomplete or irregular, the competent authority will invite the applicant to complete or regularize it. After the applicant has made his request in accordance with the regulations, the competent authority issues him a receipt.

The receipt is issued against payment of the application fees, the amount of which is fixed by joint order of the Minister in charge of Water, the Minister in charge of Finance and the other Ministers concerned.

The operation of installing a **groundwater sampling structure is subject to an environmental impact study (EIA)**. The Beninese Environment Agency sees to its realization at the expense of the applicant. The permit applicant must therefore provide documents certifying that an EIA has been carried out. If several works, installations, categories of works or activities are carried out by the same person, on the same site, only one impact study is carried out.

The competent authority has an investigation launched at the end of which an investigation report is submitted to it, together with the conclusions. At the end of the environmental impact study, a report drawn up by the consulting company that carried it out, to which the conclusions are attached, is appended to the environmental compliance certificate and given to the applicant. The latter transmits, within one month of its receipt, the complete file with the related conclusions, to the competent authority to which the request was filed, for opinion.

The file is then transmitted within two (02) weeks, by the competent authority to the territorially competent water service, together with the investigation report, for technical advice to be given.

A copy of the report and the conclusions is also sent to the municipality or the prefecture concerned, to be made available to the public for two (02) months from the date of sending the file to the department responsible for territorially competent water.

The legislative bodies of the local authorities concerned by the operation give their opinion on the authorization request within one (01) month after it has been made available to the public.

In view of the opinions issued and, where applicable, of the investigation file, the competent authority shall have the competent service responsible for water draw up a report on the authorization request and on the results of the investigation.

This report, drawn up within a maximum of fifteen (15) days, is accompanied by a proposal concerning either the refusal of the request or the envisaged prescriptions.

The report is drawn up by the competent water department and the accompanying proposals are presented in the form of an opinion, by the competent authority to the basin committee of the planned location of the installation, the work, work or activity.

The applicant has the option of being heard by the basin committee or of appointing a representative for this purpose. He is informed, by the basin committee, at least eight (08) days in advance, of the date and place of the committee meeting and simultaneously receives a copy of the proposals mentioned in article 15 of the decree.

The installation permit for underground water abstraction works, is granted by decree of the competent authority (Mayor), except when the cost of the operation requires investments whose amortization period exceeds ten (10) years or when it may have an impact on the territory of several departments. In this case, the authorization is granted by decree taken in the Council of Ministers on the proposal of the Minister in charge of Water, after consulting the National Water Council.

Any request for a permit to take groundwater is rejected if the work to install the abstraction structure has started before the submission of the permit application to the competent authority.

## 4. Procedure for obtaining a permit for hazardous waste disposal in the Republic of Benin

Hazardous wastes are wastes that present a specific danger to humans or the environment because they are composed of one or more constituents with the characteristics listed in the Basel Convention on hazardous wastes. The following waste is designated by hazardous waste (Decree No. 2003-332 of August 27, 2003):

- special waste;
- biomedical waste;
- infectious biomedical waste;
- wastes consisting of heavy metals;
- wastes containing highly harmful substances;
- chemical waste;
- pharmaceutical waste;
- radioactive waste ;
- etc.

The Minister of the Living Environment and Sustainable Development determines by decree, in accordance with the legislation in force, the hazardous waste that can be placed in sanitary landfills intended for non-hazardous waste. This can only be done after an environmental assessment and in exceptional circumstances subject to an authorization granted on a case-by-case basis by him and this, for small quantities compatible with the waste landfilled.

The Minister can give the permit applicant the authorization to treat by his own means hazardous waste generated by his activities. Nevertheless, the Ministry has the right to oversee the process of management of these hazardous wastes by the applicant.

*Nota Bene:* The management of solid household waste in the 5 municipalities of the great Nokoué (Ouidah, Abomey-Calavi, Cotonou, Sèmè-podji and Porto-Novo) is carried out under the control of the Waste Management Company and the healthiness of Grand Nokoué (Sgds-Gn).

## 5. Procedure for felling trees in Benin

The felling of trees in the Republic of Benin is subject to regulatory provisions that must be observed under penalty of a fine. All of these provisions are contained in Law No. 93-009 of July 2, 1993 on the forestry regime in the Republic of Benin, especially its Decree No. 96-271 of July 2, 1996 on the terms of application of said law. Street trees and alignment trees are, according to article 36 of this law, protected and therefore are prohibited from felling and uprooting except in cases authorized by the Forestry Administration.

Authorizations for felling trees are the prerogatives of the Directorate General of Water, Forests and Hunting and of its Departmental Directorates, which are the Forest Inspections (IF).

The cutting permit applicant must send a felling request specifying the name / species and the number of stems to be cut, the geographical location, the mode of acquisition of the trees and the reason for felling to the secretariat of the Head of Forest Inspection.

To this request, he must attach a "Certificate of Use" issued by the Village Chief who certifies his property rights (buyer or planter) on the trees which are the subject of the cutting request.

Then, the Head of Inspection assigns the file to the Municipal Water and Forestry Manager of the area concerned in order to establish a felling report. The water and forest manager and his agents come to the site to take measures concerning the tree or trees concerned by the felling request.

The report specifies the name, number of trees, circumference at human height, height and other additional details. This report, in the case of urban trees, is carried out in collaboration with one or more representatives of the town hall and the Forest Inspectorate.

This report is then sent back to the Forest Inspectorate, which registered the request, which has the latitude to issue a "Counter Report".

The cutting or felling permit is then issued to the applicant. However, taking into account the species to be felled, the applicant may be required to present in advance the payment slip for royalties provided for in the finance law to the Public Treasury or a compensation plan for trees to be cut.

It's when you don't have a tree replacement plan that you pay for. The amount to be paid is set by Water and Forests at the time of the request in accordance with the finance law of the current year.

The process is the same when it comes to a Forest Operator, with the only difference that he / she must provide a copy of his professional Forest Operator card.

There are no costs associated with obtaining a permit to cut down a tree unless the tree in question is listed in the current finance law. In this case, the permit applicant must pay the related fees.

The reasonable period provided for by law (article 61) is 15 days for the approval of the felling request. After this period, the receipt of the slaughter request constitutes authorization of a slaughter permit. Usually the cutting permit is given for one tree species. However, it is possible to obtain a cutting permit for a group of trees. In exceptional cases, it is also possible to obtain an exemption for the felling of trees. The different types of cutting permits are summarized in article 60 of the implementing decree. The validity of the cutting permit varies according to the type of permit and 72 hours to three (03) years renewable only once (Articles 61, 62, 63, 64, 65 and 66 of the implementing decree).



There are no specific rules for obtaining authorizations according to the status of the species. The only fundamental rule is that the species must not be on the Benin Red List (Neuenschander, Sinsin and Georgen, 2011: *Protection de la Nature en Afrique de l'Ouest: Une Liste Rouge pour le Bénin* (Nature Conservation in West Africa: Red List for Benin)).

Trees in urban areas, more specifically those used in the planning of urban spaces and trees in mangroves are subject to a cutting ban.

It is strictly forbidden to cut down trees in ecosystems that harbor bird or bat nests. When the ecosystem or tree is home to bird or bat nests, it cannot be subject to a logging permit. In the event of work requiring their cutting, it must be ensured that these ecosystems must be reproduced in the immediate surroundings.

There is no obligation as to the species of individuals to be replanted. It is recommended to plant another tree when cutting, but not necessarily the same species.

**Annex XI   Reports minutes and attendance lists of the public  
consultation meetings conducted in the boroughs of Tori-Cada  
and Tangbo-Djéviè – preliminary consultations**

## SÉANCE DE CONSULTATION AVEC LE MAIRE DE LA COMMUNE DE ZE

L'an 2019 et le mardi 29 octobre a eu lieu à la mairie de ZE une rencontre avec le Maire.

La séance a commencé à 14h40 par les présentations et les civilités. Ensuite, l'objectif de la rencontre avec un accent sur la nécessité d'organiser et de réaliser l'inventaire des biens et personnes, situés dans l'emprise du projet et le projet "ARISE INDUSTRIAL ZONE", ont été présentés par l'équipe sociale aux participants.

Prenant la parole, le Maire après avoir remercié l'équipe pour son explication, a mentionné qu'effectivement qu'il y a une zone autour de l'aéroport, dénommée "Zone à Aménagement Différé" (ZAD) qui a été définie lors des travaux de délimitation de l'aéroport de Glo. Cette zone selon la compréhension des élus locaux et population, devrait être une zone verte, où les populations pourront y pratiquer leurs activités agricoles. Le Maire surpris et un peu déçu, a un peu déploré que cette zone puisse servir à d'autres types d'aménagement que celui agricole car d'après lui, la commune et surtout l'arrondissement de TANGBO-DJEVIE impacté, est une zone de production d'ananas, de palmier à huile, de manioc et de maïs par excellence. Les travaux de l'aéroport ont déjà fait perdre deux villages de forte production d'ananas à l'arrondissement, avec le présent projet, le maire craint que d'autres villages et des espaces de productions de cette culture partent encore. Le Maire a déploré un peu ce fait et a expliqué que l'ananas ne peut être produit que sur des terres spécifiques et le déplacement des populations sur d'autres terres ne peut sauvegarder cette culture. Le projet engendrera à coup sûr la baisse considérable de la production de l'ananas.

Par ailleurs si les populations seront une fois encore déplacées dans des endroits, autres que leur milieu c'est aussi la destruction de toute une culture car c'est la terre de leurs aïeux et elles y sont installées depuis et y ont bâti leur mœurs, leurs coutumes, comportements, habitudes et pratiques. Là où elle sera déplacée, ce n'est pas sûr qu'elle retrouvera ses repères culturels. Ce sera une fois de plus la dispersion et la déstabilisation d'une partie du peuple du milieu.

Après l'expression de sa perception, le Maire a mentionné d'autres craintes qui se résument comme suit :

- La perte de l'identité de la commune notamment de l'arrondissement de TANGBO-DJEVIE connu d'abord comme producteur d'ananas et en général pour son taux de production agricole. Ceci d'autant qu'il existe des zones spécifiques de par leurs caractéristiques pédologiques, à la production de l'ananas.
- Une autre crainte résiderait dans l'acceptation de la population à être déplacée. Ceci à cause des désagréments issus de l'expérience du déplacement d'une partie de la population dans des milieux où elles n'ont aucun repère culturel, du fait du projet de l'aéroport de GLO. Selon le Maire le reste sera réticent car il s'agit là de toute une culture, des habitudes, des pratiques, des habitudes linguistiques qui vont être déloger et redistribuer sur des espaces étrangers à eux.

Comme suggestion,

- Le Maire suggère qu'une grande sensibilisation soit faite dans le temps, et qu'il faudra associer les élus locaux et les leaders d'opinion du milieu pour y arriver.
- Le Maire suggère également que pour ce projet et qu'il faudra vraiment dédommager les populations et non les indemniser avec des taux forfaitaires.

La séance a pris fin à 15h12 sur les conseils du maire qui a recommandé que dans notre approche des populations, nous évoquions le relogement des populations délocaliser de la zone de l'aéroport sinon il se peut qu'il y ait soulèvement de ces derniers.

Ont signé

Sylvie KPODJEDO (Sociologue-environnementaliste)

Germaine ATINDEGLA (Sociologue)

Joseph DANGBENON (Maire)

## Séance de consultation avec le maire de la Commune de Tori Bossito et le chef d'arrondissement de Tori-Cada

L'an 2019 et le mercredi 30 Octobre a eu lieu une séance d'entretien avec le maire de Tori-Bossito et le CA de Tori-Cada à la mairie. La séance a démarré à 9h 45 par les civilités d'usage, la chargée du volet sociale a pris la parole pour expliquer au maire et au chef d'arrondissement de Tori-Cada le projet de Zone Economique Spéciale (ZES) de "ARISE". Les autorités locales ont été ensuite invitées à donner leurs perceptions du projet, ainsi que leurs attentes, craintes, suggestions et recommandations.

Le maire après avoir remercié l'équipe pour sa présentation a fait état du fait qu'à l'issue des travaux de l'aéroport, les autorités avaient été informées d'une zone dénommée ZAD (Zone d'Aménagement Différée) qui devrait se situer dans un rayon de 3 Km autour de l'aéroport.

L'Etat avait demandé qu'il n'y ait pas d'habitations humaines dans cette zone qui est dédiée à un autre type d'aménagement. Car la proximité des populations de l'aéroport pourrait engendrer des nuisance sur le plan sanitaire pour elles.

Prenant à son tour la parole, le chef d'arrondissement de Tori-Cada a aussi mentionné avoir entendu parler de la ZAD mais que dans leur appréhension, cette zone devrait habiter un aménagement vert, par exemple, une forêt et à côté, les populations pourraient toujours continuer leurs activités agricoles.

Cette explication du projet suscite quelques inquiétudes au niveau du Chef d'arrondissement de Tori-Cada qui a posé quelques questions à savoir :

- Si avec le projet, on en arriverait encore à un déplacement des populations.
- Et si la réponse de la première préoccupation se révèle positive, si la population serait encore victime d'une dévalorisation de ces terres, comme ça a été le cas pour l'aéroport ? car d'après le CA de Tori-Cada, à la data actuelle, la valeur des terres est en hausse dans la Commune.

Les craintes exprimées par le maire et le CA de Tori-Cada après les explications de l'équipe sociale à l'issue des échanges se structurent comme suit :

- Le projet va engendrer la perte des terres, des habitats pour les populations situées dans l'emprise du projet et surtout pour les populations du village de Dokanmè qui est un village fortement peuplé avec environ plus de 2000 habitants. Tout le village risque de partir (disparaître).
- Dans le milieu de Tori, la richesse des populations c'est d'abord leur terre, si le projet doit engendrer la perte de ces terres, il faut que le dédommagement se fasse avec la plus grande équité et justice et que ce ne soit pas des coûts forfaitaires qui soient donnés aux Personnes Affectées par le Projet.
- Dans la mise en œuvre du projet, il faut que l'entreprise veille à amoindrir ou à ne pas créer trop de dommage sur la santé et la sécurité des riverains de même qu'à protéger l'environnement.

Comme suggestions, les autorités locales mettent l'accent en premier sur :

- La sensibilisation des populations concernées avec l'aide de l'implication des élus locaux et des leaders du milieu.
- Ensuite elles suggèrent que l'Etat aide les PAPs à ne pas abandonner leurs activités qui représentent le gage de leur gagne-pain.
- Et pour finir, si le projet doit amener au recrutement de la main d'œuvre, il faut que les PAPs et leur enfants puissent être priorisés, de même que la main d'œuvre locale en générale car la Commune regorge de compétence.

Les recommandations faites par les autorités à l'équipe sociale sont les suivantes :

- Dans le cadre de l'inventaire des PAPs, il serait mieux d'utiliser les canaux d'informations du milieu (radio locale, crieurs publics,...).
- Il faudra aussi s'entendre avec les chefs villages sur l'organisation pratique à mettre en place pour cet inventaire.

- La mairie pourra mettre à disposition le répertoire des acquéreurs de parcelle du service domanial de la mairie qui a été actualisé jusqu'en 2016.

Enfin l'équipe a convenu d'un rendez-vous avec les chefs des villages concernés dans l'arrondissement de Tori-Cada avec la participation du CA de cet arrondissement mais également le CA de Tori-Avamè pour le lendemain Jeudi 31 Octobre 2019 à 15h précises dans les locaux de l'arrondissement de Tori-Cada.

La séance a pris fin à 11h 15 après une synthèse de la rencontre et un rendez-vous avec les CA de Tori et les chefs villages concernés pour le Jeudi 31 Octobre à 15h dans l'enceinte de l'arrondissement de Tori-Cada.

Ont signé

Sylvie KPODJEDO (Sociologue- Environnementaliste)

Germaine ATINDEGLA (Sociologue)

Robert V. TOLEGBON (Maire)

Alain FADEKON (CA Tori-Cada)



## Rencontre préparatoire ou organisationnelle des inventaires PAP avec les chefs villages et le chefs d'arrondissement de TANGBO-DJEVIE concernés par le projet dans l'arrondissement de Zè

L'an 2019 et le mercredi 30 octobre, s'est tenue dans l'arrondissement de TANGBO-DJEVIE, une rencontre de l'équipe sociale du projet "ARISE INDUSTRIAL ZONE" avec le chefs d'arrondissement et les chefs de villages de Houézè, Djitin-Aga, Agbodjèdo et Anavié.

La séance a commencé à 14h05. Par les présentations et les civilités. Ensuite, l'équipe sociale a procédé à la présentation du projet aux participants à la réunion tout en mettant l'accent sur l'objectif principale de la réunion, qui est la mise en place d'une organisation pour la réalisation des inventaires PAP.

Prenant la parole à la suite de l'équipe, le chef d'arrondissement de Tangbo-Djèvié a déclaré être informé d'un projet appelé "Zone à Aménagement Différée (ZAD)". Il a aussi noté la présence de l'Institut Géographique Nationale IGN dans leur arrondissement qui faisait des délimitations et que ses tentatives pour se rapprocher des représentants de l'institut dans leur milieu et obtenir des informations sur ce qui se passe, n'a rien donné. Car ses représentants qui se sont fait accompagner des forces de l'ordre n'ont rien voulu leur dire. Le CA a mentionné que depuis lors qu'il avait soupçonné que quelque chose se trame encore au niveau de l'Etat concernant leur arrondissement sans savoir au juste quoi.

Tout en remerciant l'équipe pour l'information, il a noté qu'en principe il revient à l'Etat de leur apporter cette délicate information et non au bureau d'étude chargé d'évaluer les impacts environnemental et social du projet. Si l'état avait fait normalement les choses en apportant lui-même l'informations, ne serait-ce qu'aux élus locaux, une sensibilisation de la population aurait été organisée et réalisée par ses derniers en direction des populations avant même la délimitation que fait l'IGN en ce moment. « Même si nous avons entendu parler de la ZAD, le gouvernement ne nous a pas clairement expliquer ce qui va se faire » a ajouté le Chef d'arrondissement(CA)

Prenant la parole à la suite du CA, le Chef Village (CV) de Agbodjèdo a voulu savoir quelles sont les limites réelles de la zone concernée car avec ce que l'équipe leur explique, il urge de sensibiliser les populations avant tout inventaire des PAPs. Cette sensibilisation ne pourra se faire qu'en connaissant les limites de l'emprise du projet. Ceci permettra l'identification des vrais PAPs en vue de les mobiliser et de les sensibiliser.

Le chef village de Anavié à la suite de ses prédécesseurs demande la précision sur la superficie de la zone du projet.

Le chef d'arrondissement a voulu encore comprendre comment seront recensé les propriétaires qui n'ont pas de conventions et ceux qui sont propriétaires selon le droit coutumier ?

Après des explications données par l'équipe pour répondre aux préoccupations, les élus locaux, la carte de la zone leur a été montrer pour plus de précision. Néanmoins ils souhaitent la visite de site.

Tout en reconnaissant que le projet tel qu'expliquer va permettre la modernisation du milieu, du fait de l'électrification, de la construction de route, des canalisations, des adductions d'eau et des besoins de mains d'œuvres probables dans le milieu.

Les élus locaux ont souhaité que la main d'œuvre locale soit recrutée en premier notamment qu'une priorité soit accordée à la main d'œuvre des PAP et de leurs enfants surtout que la terre est la première richesse dans la localité et que l'arracher aux populations équivaut à les priver d'activités qui leur permet de se réaliser.

Les élus ont exprimé d'autres préoccupations qui sont :

- Il faut que les populations puissent être dédommager à la hauteur réelle de la valeur de leur bien si dédommagement dû au déplacement il doit avoir. Ils ne souhaitent pas voir se reproduire la scène de la zone de l'aéroport ou la population a été dédommagée sur une base forfaitaire qui ne réponde à rien.
- Si la zone identifiée telle qu'expliquée est plus agricole qu'habité, il serait important que les travaux du projet n'extrapolent pas au point de toucher les habitations.

Avec ce projet il y aura diminution des activités agricoles caractéristiques du milieu telles que ; la production de l'ananas, du manioc, du maïs et des plantations de palmiers à huile. Pour eux le projet engendra à coup sur la famine dans le milieu d'autant plus que la culture de l'ananas ne peut se faire partout et que la commune de Zè notamment l'arrondissement de TANGBO-DJEVIE est une zone de culture de l'ananas par excellence et cela depuis le temps des ancêtres.

Au niveau des chefs villages il y a les listes des acquéreurs de parcelles qui peuvent être fournies et mises à la disposition de l'équipe de recensement mais ça ne servirait à rien ou du moins pas à grande chose.

Ce qui sera plus efficace pour la mobilisation des PAPs, ce sera que les géomètres du bureau arrivent sur le site et montrent les limites exactes pour permettre aux CV qui devront être présents lorsque les géomètres seront là, de mobiliser les PAPs.

Les chefs de villages de même que le chef arrondissement promettent de se rendre disponible pour la période de ces inventaires qui selon eux, si cela devrait être fait avec sérieux ne peut durer 10 jours. Des moyens s'imposent évidemment pour la réalisation de ce travail ont martelé les chefs de village.

La séance a pris fin vers 16h30, après une synthèse de l'équipe sociale.

Ont signé

Sylvie KPODJEDO (Sociologue- Environnementaliste)

Germaine ATINDEGLA (Sociologue)

CA TANGBO DJEVIE

KPATINVO Nobert CV ANAVIE

DAH AZA LOGLOHOU CV AGBODJEDO

CV HOUZEZ

KPOSSA SEDJRO Conseiller DJITIN AGA

SOGNONDE THOMAS CV DJITIN AGA

HOUESSOU BOSSA C. J. RAIMI CV AVLESSA

TALOU Célestin Conseiller

## RENCONTRE PREPARATOIRE OU ORGANISATIONNELLE DES INVENTAIRES PAPS AVEC LES CHEFS DES VILLAGES ET LE CHEF D'ARRONDISSEMENT DE TORI CADA ET TORI AVAME CONCERNES PAR LE PROJET DANS L'ARRONDISSEMENT DE TORI CADA

L'an 2019 et le jeudi 31 octobre s'est tenu une rencontre entre l'équipe sociale du projet « ARISE INDUSTRIAL ZONE », les Chefs d'arrondissement de TORI CADA et TORI AVAME et les chefs village de Sogbé, Zèbè, Gbétaga, Dokanmè, tous concernés par le projet.

La séance a commencé à 15h17 par les présentations d'usage et les civilités. Ensuite une présentation du projet fut faite par l'équipe social aux participants tout en mettant l'accent sur l'objectif de la rencontre qui est en premier de préparer l'inventaire des personnes et bien situés dans l'emprise du projet.

Prenant la parole à la suite de l'équipe sociale le chef de Dokanmè a voulu savoir si en plus des espaces de l'aéroport, l'Etat veut encore leur arracher leur terrain qui reste, mettant ainsi fin à l'existence du village de Dokanmè. Selon les chefs de Dokanmè, les travaux de l'aéroport ont déjà amorcé un espace considérable de ce village qui est cependant le plus peuplé de l'arrondissement de TORI-CADA, avec l'érection de beaucoup d'habitations. Avec le présent projet, le village de Dokanmè risque de disparaître pour toujours de l'arrondissement de TORI-CADA. " c'est pourtant la terre de nos aïeuls. Nous y sommes nés, y avons grandi, y avons même enterré nos aïeuls. Ne sommes-nous pas des béninois aussi" s'est exclamé CV. L'Etat n'a même pas encore fini de dédommager et de reloger les PAPS de la zone de l'aéroport et déjà, un autre projet survient qui veut faire encore d'autres PAPS.

Prenant à son tour la parole, le chef du village de Gbétaga annonce que les 3028 ha, représentant les mesures du domaine de l'aéroport, apparaissaient déjà aux yeux de la population de Tori, énorme et qu'elle est entrain de réfléchir à comment négocier auprès de l'Etat pour qu'il réduit les dimensions afin de permettre aux populations de continuer à y pratiquer leurs activités agricoles, qui du reste assurent leur subsistance. Mais voilà qu'un autre projet est en cours qui aggravera plus la situation pour nous les villageois. "Et les endroits où nous avons enterré nos parents ? que pense-t-on en faire ? où va-t-on mettre les habitants situés dans l'emprise du projet ?"

Le chef village de Dokanmè demande pourquoi l'Etat n'avait pas pris toute l'espace dont il avait besoin en bloc en son temps. Et pourquoi il attend maintenant pour leur porter un nouveau coup.

Intervenant à son tour, le CV de Sogbé a remercié la démarche d'information du bureau ANTEA à travers son équipe sociale. Il a mentionné qu'au-delà de tout, que l'aménagement va être pour le bien et l'évolution du milieu qui connaîtra une modernisation. Il a suggéré que pour une information réussie des propriétaires de terre du milieu, qu'il faut prendre par voie de presse nationale et locale car la remarque est qu'actuellement les terres ont été complètement vendues aux cadres qui vivent à Cotonou et autres villes. Il serait plus facile d'atteindre ces derniers par voie de presse.

Remerciant de même l'équipe à la suite de son prédécesseur, le chef d'arrondissement d'Avamè a observé qu'il pense que l'Etat n'a nullement nourrir le désir de suspendre les populations et que c'est sûrement ça qui justifie la venue des représentants du bureau d'ANTEA pour la présente séance d'informations dans leur localité. Il a ensuite attiré l'attention sur le fait qu'il y a des propriétaires qui ont hérité par voie coutumière et ne disposent pas de documents physiques légaux pouvant justifier leur statut de propriétaire pour pouvoir bénéficier d'une quelconque indemnisation si le cas devait se présenter. Il faut que pour ce projet l'Etat réfléchisse à ces cas car concernant le domaine de l'aéroport, les PAPS qui sont dans ce cas n'ont pu bénéficier d'indemnisation.

Le chef d'arrondissement de TORI-CADA a apporté une réponse à la préoccupation émise par son collègue de Avamè en reconnaissant qu'effectivement avant les attestations de détention coutumière n'étaient pas respecter dans la commune, mais qu'actuellement, ces attestations sont entrain d'être régularisées au niveau communale.

Reprenant la parole, le Chef du village de Dokanmè a mentionné que bien que des inventaires et enregistrement des PAPs aient été faits au niveau de la commune de Glo, pour le projet de l'aéroport, que les PAPs n'ont été invités qu'à signer des documents à l'issus de ce recensement et que les indemnisations n'ont respecté la valeur réelle des terres. Pour une terre de 3500.000Fcfa/ha, par exemple, le propriétaire n'a reçu que 750.000Fcfa/ha et cela, des années après le dit inventaire. " nous ne voulons plus de ces cas de figures". Si l'Etat veut dédommager les PAPs, qu'il le fasse dans le temps au moment même où les valeurs des terres correspondent au montant des indemnisations.

Formulant une doléance le CV de Dokanmè a suggéré que même si son village doit être entièrement emporté par le projet, que l'Etat trouve de l'espace dans l'arrondissement pour y reloger la population de ce village qui ne veut pas être relogée ailleurs trop loin de ses référentiels culturels.

Le CA de TORI-CADA tout en précisant et en accentuant la nécessité de faire des sensibilisations au niveau des populations concernées avec forte implication des CV, crieurs publics mais aussi en prenant par les radios locales et la radio nationale pour parvenir à une réelle mobilisation des PAPs dans le cadre des inventaires, a également soulevé la préoccupation des limites du projet. Pour lui il faut que les CV connaissent les limites pour pouvoir s'investir dans la mobilisation des PAPs concernées par le projet.

Renchérissant, le CV de Sogbé a insisté sur le fait qu'il faut prendre par la radio nationale pour informer les acquéreurs de parcelles résident à Cotonou et ailleurs.

Le CV de Zèbè et le CA de Avamè tout en appuyant sur la nécessité de leur montrer les limites ont également demandé que le bureau d'ANTEA, les informe pour qu'ils se rendent disponibles pour accueillir et accompagner l'équipe de topographe, lors de la visite pour connaître les limites.

La séance a pris fin à 16h48 après une synthèse de la séance par l'animatrice, synthèse approuvée par les participants à la séance.

Ont signé

Sylvie KPODJEDO (Sociologue-Environnementaliste)

Germaine ATINDEGLA (Socio-Anthropologue)

FADEKON Alain CA TORI-CADA

ALOU Adrien CV SOGBE

ODOU Marcellin CV DOKANME

LANTEFAN Romain CA AVAME

DAGA Rigobert CV ZEBE

AVOCETIEN Séraphin CV GBETAGA

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**Compte rendu de la visite de délimitation du site du projet «ARISE Industrial Zone» pour l'Etude d'Impact Environnemental et Social (EIES) avec les Topographes, le Chef d'Arrondissements (CA) et les Chefs des Villages concernés de l'arrondissements de TANGBO-DJEVIE, dans la commune de ZE**

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## **Compte Rendu de visite de d'indication de limites du site du projet aux autorités locales concernées**

**Date/ heure :** 05/11/19 de 8h30 à 16h45

**Lieu :** Arrondissement de Tangbo-Djèvié

**Responsable compte rendu :** Sylvie KPODJEDO

**Références liste de présences** (pas de liste de présence élaborée de façon formelle)

**Objet de la visite :** Montrer aux autorités locales les limites du site du projet.

**Références photos associées**



Dans le cadre de l'étude d'impact Environnement et Sociale du Projet "ARISE INDUSTRIAL Zone", a eu lieu le mardi 05 Novembre dans la commune de ZE, une visite de délimitation de site dans l'arrondissement de Tangbo- Djèvié de l'équipe de topographes/cartographes et sociologues ANTEA avec les autorités locales, conformément aux souhaits de ces derniers. Cette visite souhaitée, par les chefs village et le chef d'arrondissement de Tori- Cada, a pour objectif principal de montrer au CA et CV des villages de AGBODJEDO, DJITIN AGA, HOUEZE, ANAVIE, les limites des zones concernées par le projet en vue de la mobilisation des Personnes Affectées par le Projet (PAPs), pour leur recensement.

L'équipe de consultants d'ANTEA est arrivée à l'arrondissement à 8h30. L'équipe de topographe/géographe a mis en place la station GNSS. Le démarrage des travaux de reconnaissance des limites du site a effectivement commencé avec le CA, les Chefs villages, avec les autorités locales (chef d'arrondissement et les chefs des villages concernés). Notons que la visite du site commencée en voiture et à motos, a été poursuivie à pieds à certains endroits.

**Résultats de la visite**

La marche sur le site nous a permis de :

- Montrer aux autorités, quelques points limites du site du projet et en projetant, les autres points,
- Relever quelques points GPS
- Apporter des explications à quelques préoccupations des chefs villages, conseillers et chef arrondissement pour mieux comprendre.
- Constaté La présence de quelques habitations sur le site,
- Constaté que la grande partie des zones habitées sont épargnées par le projet. Ce constat a eu pour effet d'apaiser et de dissiper la crainte des chefs villages

Vers 15H00 un point de la visite a été fait avec les autorités locales qui se structure autour de :

- La remarque que les chefs villages connaissent la plupart des PAPs et ont la confiance de la population,
- L'acceptation des autorités locales (CA et CV) à accompagner l'équipe dans l'exécution des travaux de sensibilisation, de mobilisation et de recensement des PAPs contre un forfait rémunérateur pour leur déplacement, leur communication (contact téléphonique PAPs vivants hors de la localité) mais aussi pour leur temps de disponibilité, vu qu'ils devront laisser leurs activités pour se rendre disponibles pendant l'opération,
- La mise en place d'une organisation, à savoir la mise à contribution des crieurs publics dans les villages pour l'information et la mobilisation des PAPs au niveau village.
- L'identification des lieux où les postes d'enregistrement des PAPs seront installés par l'équipe.

La visite pris fin à 16h 45 et l'équipe est revenue dans les locaux de ANTEA Bénin à 17h30.

Ont prit part à cette visite :

Le Chef de l'arrondissement de Tangbo- Djèvié,

Le Chef Village de Anavié,

Le chef village de Houézè,

Le chef village de Djitin- Aga,

Le Chef village de agbodjèdo,

Sylvie KPODJEDO, équipe sociale de l'EIES,

Germaine ATINDEGLA, équipe sociale de l'EIES

Sylvestre KPAKPO, topographe de l'EIES,

Ulysse GBAGUIDI



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**Compte rendu de la visite de délimitation du site du projet «ARISE Industrial Zone» pour l'Etude d'Impact Environnemental et Social (EIES) avec l'équipe topographe, le CA et les CV de arrondissement de Tori Cada (TORI)**

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## **Compte Rendu de visite de d'indication de limites du site du projet aux autorités locales concernées**

**Date/ heure :** 06/11/19 de 8h30 à 16h45

**Lieu :** Arrondissement de Tori-Cada

**Responsable compte rendu :** Sylvie KPODJEDO

**Références liste de présences** (pas de liste de présence élaborée de façon formelle)

**Objet de la visite :** Montrer aux autorités locales les limites du site du projet.

**Références photos associées**



**Photos arise visite de précision des limites de la zone du projet aux autorités locales de Tori- CADA**



**Photos arise visite de précision des limites de la zone du projet aux autorités locales de Tori- CADA**

Dans le cadre de l'étude d'impact Environnement et Sociale du Projet "ARISE INDUSTRIAL Zone", a eu lieu le mercredi 06 dans la commune de Tori- Bossito, une visite de délimitation de site dans l'arrondissement de Tori- Cada de l'équipe de topographes/cartographes et sociologues ANTEA avec les autorités locales, conformément aux souhaits de ces derniers. Cette visite souhaitée, par les chefs village et le chef d'arrondissement de Tori- Cada, a pour objectif principal de montrer au CA et CV des villages de SOGBE, DOKANME, ZEBE, GBETAGA, les limites des zones concernées par le projet en vue de la mobilisation des Personnes Affectées par le Projet (PAPs), pour leur recensement.

L'équipe de consultants d'ANTEA est arrivée à l'arrondissement à 9h 15. Le démarrage des travaux de reconnaissance des limites du site a effectivement commencé à 10h, avec les autorités locales (chef d'arrondissement et les chefs des villages concernés). Notons que la visite du site commencée en voiture et à motos, a été poursuivie à pieds à certains endroits.

### **Résultats de la visite**

La marche sur le site nous a permis de :

- Montrer aux autorités, quelques points limites du site du projet et en projetant, les autres points,
- Constater La présence de quelques habitations sur le site,
- Constater que la grande partie des zones habitées sont épargnées par le projet. Ce constat a eu pour effet d'apaiser et de dissiper la crainte des chefs villages surtout celui de DOKANME qui pensait qu'avec ce projet le reste de son village va "disparaître". Ils ont compris que le site de la zone du projet "ARISE" est essentiellement occupé par les cultures et les plantations. Néanmoins, à l'intérieur de ces plantations se trouvent quelques maisons dispersées ou groupées.

Vers 16H, un point de la visite a été fait avec les autorités locales qui se structure autour de :

- La remarque que les chefs villages connaissent la plupart des PAPs et ont la confiance de la population,
- L'acceptation des autorités locales ( CA et CV) à accompagner l'équipe dans l'exécution des travaux de sensibilisation, de mobilisation et de recensement des PAPs contre un forfait rémunérateur pour leur déplacement, leur communication( contact téléphonique PAPs vivants hors de la localité) mais aussi pour leur temps de disponibilité, vue qu'ils devront laisser leurs activités pour se rendre disponibles pendant l'opération,
- La mise en place d'une organisation, à savoir la mise à contribution des crieurs publics dans les villages pour l'information et la mobilisation des PAPs au niveau village.
- L'identifications des lieux où les postes d'enregistrement des PAPs seront installés par l'équipe.

La visite pris fin à 17h après un rafraichissement avec les élus locaux. L'équipe est revenue dans les locaux de ANTEA Bénin à 18h45.

Ont prit part à cette visite :

Le Chef de l'arrondissement de Tori- Cada,

Le Chef Village de Dokanmè,

Le chef village de Sogbé,

Le chef village de Zèbè,

Le Chef village de Gbétaga,

Sylvie KPODJEDO, équipe sociale de l'EIES,

Germaine ATINDEGLA, équipe sociale de l'EIES

Sylvestre KPAKPO, topographe de l'EIES,

Ulysse GBAGUIDI

15-11-19

## Consultation Publique avec la population riveraine de l'arrondissement de Tangbo-Djévié

L'an 2019, le vendredi 15 Novembre a eu lieu une séance de Consultation Publique à l'arrondissement de Tangbo-Djévié.

La séance a démarré à 10h 35mn par les civilités, ensuite l'équipe a prit la parole pour expliquer le projet au population.

Prenant la parole à son tour la population a exprimé sa perception qui se structure comme suit :

- Le projet pourrait être bénéfique pour la population de l'arrondissement de Tangbo-Djévié si au paravent elle n'avait pas été dépossédée de ses terres et de ses maisons dans le cadre du projet de l'aéroport



(2)

- L'agriculture est l'activité principale de la population dans l'arrondissement Tangbo-Jjeuré car c'est grâce à cette activité qu'elle survient à sa <sup>besoins</sup> subsistance, entretient la famille, envoie les enfants à l'école et vient en aide aux autres membres de la famille. La population qui dans sa majorité n'a pas été à l'école considère que la terre est leur richesse par excellence ; leur arracher ce qui en reste maintenant reviendrait à les exterminer.

Le projet suscite beaucoup de préoccupations de la part de la population à savoir :

- Qu'avons-nous fait dans l'arrondissement de Tangbo-Jjeuré ? on dirait que l'état à quelque chose contre nous ! Même si on nous remet des milliards, ça ne servirait à rien, on est déjà neutrisé par les événements dans le cadre du projet de l'aéroport !

(3)

- Où irons-nous pour acquérir des terres proche de notre milieu et préserver nos mœurs et cultures - Il y a quarante ans Tangbo-Jévié n'était pas aussi développé, aujourd'hui cet espace ne suffit plus à nos enfants. Qu'est-ce que l'État pense pouvoir nous reloger?
- Pourquoi n'avoir pas pris toute l'espace recherché dans le cadre du projet de l'aéroport? Maintenant que nous avons fini avec l'aéroport, il faut encore nous prendre le reste de nos terres? jusqu'à quand? Pitié! C'est pas bien.
- On dirait un harcèlement de la population de Tangbo-Jévié par l'État - L'État n'a qu'à amener le projet dans localité et nous laisser vivre en paix -
- Quelque soit les impacts positifs de ce projet la population de Tangbo-Jévié n'en veut pas.



(4)  
- Quel travail peut espérer un agriculteur ou un artisan dans un projet de zone industrielle ? Nous n'avons jamais été à l'école - et même nos enfants qui ont des diplômes ne viennent faire des activités agricoles parce qu'ils n'ont pas trouvé de travail. Nous n'avons aucune confiance en ce qui concerne le recrutement de la main d'œuvre au sein de la population pour ce nouveau projet.

- Peut-on voir l'arrêter qui a consacré la zone à aménagement différée (ZAD) ?

Comme crainte la population pense que le projet va amener la recrudescence du vol, la famine, la destruction des vieilles habitations environnantes, la pollution sonore et atmosphérique, la dislocation des familles des orénales, le braquage, la criminalité, la profanation des tombes et des lieux sacrés - la destruction des mœurs et coutumes.



(5)

Pour la population ce projet n'aura aucun impact positif. Ils pensent que l'Etat devra identifier d'autres localités pour implanter le projet -

Les populations souhaitent qu'une délégation gouvernementale se portent vers elle pour un dialogue -

Que l'Etat prennent dans le domaine de l'aéroport c'est à dire dans les 3028 hectares pour réaliser ce projet -

Que l'Etat trouve à la population des villages impactés d'autres terres dans l'arrondissement de Tangbo Djévi si l'état doit ~~réaliser~~ <sup>réaliser</sup> ce projet de Zone économique et sociale et qu'il dédommage les population impactées suivant la valeur réelle des terres -

(6)

La séance a pris fin à 13h30  
après une synthèse générale de  
l'équipe d'animation.

Ont signé

KPOTEDO Sylvie  
(Sociologue - Environnementaliste)

ATINDEGLA Germaine  
Socio - Anthropologue

SOCHI Firmin  
Sociologue

Donc avoir autorisé  
la tenue de la séance  
ce jour = 15/11/19

Didier B. K. ANAGONDI



## **Compte Rendu situation à l'arrondissement de Tangbo –Djèvié dans la Commune de Zè**

**Date/ heure :** 15/11/19

**Lieu :** Arrondissement de Tangbo –Djèvié dans la Commune de Zè

**Responsable compte rendu :** Sylvie KPODJEDO

La consultation Publique à l'Arrondissement de Tangbo –Djèvié dans la commune de Zè, a été très houleuse. Car la population est très hostile au projet et ne veut pas en entendre parler.

Le Chef d'Arrondissement a prétexté un problème de santé de sa femme et n'est pas venu assister à la séance de consultation

La population à l'issue de la séance a refusé de signer le P V car aucune autorité de l'Etat n'était présente et selon elle, rien ne prouve la légitimité de l'équipe sociale de ANTEA venue pour la séance. Aucun courrier administratif

Elle souhaite un dialogue avec les autorités de l'Etat

Le Chef d'arrondissement qui est venue à l'issue de la séance, après un ènième coup de téléphone de notre part, a (contrairement à son attitude de bon accueil de l'équipe depuis le démarrage des travaux) aussi remis en cause la légitimité de l'équipe. Selon lui, l'équipe est venue sur le terrain avec la seule recommandation verbale du Maire, sans aucun courrier officiel de l'Etat central.

Tout en acceptant de signer le PV de la consultation publique, le Chef d'Arrondissement, recommande à l'équipe d'attendre avant de poursuivre les travaux que l'administration centrale leur envoie un courrier officiel par rapport au projet.

Date, le 15/11/2019

Commune de : ZC  
 Arrondissement de : TANGBO-DJENIE  
 Village de : Tangbo - Djénie

### Consultation publique avec la population riveraine du site de la zone Economique Spéciale de

#### Liste de présence

N°	NOM et PRENOMS	Structure	Qualification	Adresse/ téléphone	Emargement
1	Houéna Rigobert		Exploitant	64594059 62099810	Refus
2	ArosseGNIN Gprien		Conducteur moto	96533444	Refus
3	Ténonto Francis		—	—	Refus
4	Neugbagnon Yémami		cultivateur	01209247	Refus
5	AGUIDA Mathieu		cultivateur	—	Refus





anteagroup

6	<del>CV Agbodo</del>				Refus
7	Amonson A. Alarabhe				Refus
8	<del>SO GAVONDE HONFON</del>				Refus
9	GOUFONHOUN YVES		Metallurgiste S Meleau	9707 4904 9707 2762	<del>Refus</del>
10	Houssou Bossa-Cy Sami		C.V. Ardena	97 884 60	<del>Refus</del>
11	ANAGONOU Lucien		<del>97 884 60</del> cultivateur	97 845 196	Refus
12	BOSSA André		Enseignant	62 60 209	<del>Refus</del>
N°	NOM et PRENOMS	Qualification	Adresse/ téléphone	Emargement	
13	HONFO Jeanne		97-12 3672		
14	GUELIZON Bertin		94 48 66 42		



## anteagroup

15	LOKOSSOU Robert		Agriculteur 974522690	974522690	<del>Signature</del>
16	AGBODÉ Grégoire		TOPOGRAPHE	67.154545	<del>Signature</del>
17	LOGLOHOUÉ AZA		CV. AGRO <sup>DE</sup>	97379422	<del>Signature</del>
18	KPOGBEMIN Marcel		Agriculteur	97416351	<del>Signature</del>
19	OKÉ		EMILE	97434051	<del>Signature</del>
20	MOATO Aristide		Tailleur	66649963	<del>Signature</del>
21	KPONDEHOU Charles		Enseignant	97485660	<del>Signature</del>
22	ADAKPE K. Jean Paul		conducteur gros porteur	67532531	<del>Signature</del>
23	HOUNGBEMIN Léon		Mécanicien vélo - motor	97088185	<del>Signature</del>
24	TCHAO Alimi		Mécanisme	97227229	<del>Signature</del>





## anteagroup

25	PACOM SINZOGAN	<del>67066052</del> ZFM	<del>77777777</del> 67066052	<del>1/5</del>
26	HONKPA7/NGhaakpa	Elève	97272995	<del>1/5</del>

27	AFFOVEDE Emile	Châffeur	97257563	<del>1/5</del>
28	AHANJOGBE Moïse	cultivateur	97293423	<del>1/5</del>
29	SONONDE Jacob	Etudiant	67-63-21-50	<del>1/5</del>
30	SONONDE T. Juc	Exploitant agricole	67-63-21-50	<del>1/5</del>
31	SONONDE Z. Thomas	11 11	95454672	<del>1/5</del>
32	SONONDE Mathias	Etudiant	67299859	<del>1/5</del>
33	Klouye C. Vincent	Producteur agricole	97247253	<del>1/5</del>
34	AHOUAN DOU	Receveur	95-53-79-00	<del>1/5</del>
35	AHONSO Lucien	Cultivateur	66776723	<del>1/5</del>
36	GOANON d-Christien	Cultivateur	95292270	<del>1/5</del>
37	GOANON Séverin	Cultivateur	98897625	<del>1/5</del>
38	KPOGBEMIN Bonifas	Cultivateur	97458617	<del>1/5</del>
39	KOUDEDO François	11	9423854	<del>1/5</del>
40	AHLONSSOP Dominiq	11	64900231	<del>1/5</del>

41 ~~HOUESSA~~  
~~Regobert~~

42 NOUMAKON  
Bernard

43 Hounnamon  
Gaston

44 Housser TOWANON

45 AKOSSA HOUNKANA

46 SOGNONDE Traoré

47 TOMAGO Marcel  
~~HOUESSA~~

48 TELEHOU Fabrice

49 NOUMAKON Moise

50 DJOSSOU Jean-Maire

51 GBEZEVON  
Germain

52 MIGNONHIN

53 Penbomé

54 NOUMAKON  
Josephine

55 HOUNAKON  
Paul

cultivateur

Cultivateur

cultivateur

cultivateur

cultivateur

cultivateur

Etudiant

cultivateur

Enseignant

chercheur

cultivateur

cultivateur

cultivateur

Cultivateur

63 41 22 74

98 17 00 62

97 99 31 47

61 20 92 67

98 14 47 79

95 71 53 42

97 84 49 23

96 39 86 07

60 76 80 65

~~1/13~~

~~1/13~~

~~2/13~~

~~1/13~~

~~1/13~~

~~1/13~~

~~1/13~~

~~1/13~~

~~1/13~~

~~1/13~~

~~1/13~~

56 AGBAKOU  
57 Félice  
58 ~~Adon~~ Adon  
Germain

CVIANGBO-  
DO

Tailleur

65-988840

97-149943

~~Yves~~

~~Yves~~



14/11/2019

## Consultation Publique avec la population riveraine du site du projet dans l'arrondissement de Tori - Cada, Commune de Tori-Bossito

L'an 2019 et le lundi 11 novembre s'est  
tenu dans l'arrondissement de Tori-Cada,  
une Consultation Publique avec la population  
riveraine du site du projet "ARISE INDUSTRIAL  
Zone".

Commencé à 15h 30 par les autorités, l'équipe  
sociale a expliqué ensuite le projet aux à la  
population en mettant accent sur les impacts  
probables que le projet pourrait générer.  
La population fut ensuite invitée à exprimer  
sa perception du projet, des préoccupations,  
ses attentes, ses suggestions et recommandations.

Très remontée par l'information de la réalisa-  
tion d'un nouveau projet dans leur localité  
qui s'étendra sur leur espace cultivable,  
les populations de l'arrondissement de Tori-  
Cada ont exprimé leur surprise et quelques  
préoccupations qui se structurent comme suit:

- Comment vont se passer les choses?
- va t-on encore nous prendre nos terres  
cultivables?
- Nous vivons de l'agriculture, si on arrache



encore nos terres, comment allons nous vivre? ②  
- Nous n'avons aucune autre compétence, nous ne savons que cultiver la terre et cela depuis le temps de nos ~~ancêtres~~ aïeux, nous avons hérité cela d'eux. Quel sera notre sort?

- Qu'allons nous devenir? Et comment allons nous manger et assumer nos responsabilités familiales si vous nous arrachez nos terres?

- Avec le projet de l'aéroport, l'Etat nous a déjà arraché une grande partie de nos terres et jusqu'à aujourd'hui, tout le monde n'a pas encore été dédommé, encore que le dédommagement n'a pas respecté le coût et la valeur réelle des terres.

Pourquoi l'Etat ne peut prendre pour la Zone Economique spéciale, sans les 3028 ha délimitée pour la zone de l'aéroport?

- N'y-a-t'il des terres qu'à Tori?

- L'Etat veut-il finir avec Tori?

- Que devient Tori si on nous dépouille de toutes nos terres?

- L'Etat fera mieux de nous enterrer tous vivants et ainsi, il saura qu'il a fini avec nous, avec la population de Tori.

- La Zone à Aménagement Différé dont a parlé nos autorités locales, nous n'en sommes pas informée à la base. Elle doit rester à combien de kilomètre de l'aéroport? La nouvelle zone



fait-elle partie de la ZAD?

(3)

- Quelle superficie va couvrir le nouveau projet Et quelles sont les limites Et où sont-elles?
- L'Etat a prit 3028 ha pour le domaine de l'aéroport et nous avons pleuré, tempêté et finalement nous avons fini par accepter mais notre blessure est encore béante pourquoi veut-il en rajouter avec ce nouveau projet?

De telle aménagement dans un milieu engendre trop de problème pour le milieu.

- Déjà avec ce projet c'est la famine garantie non seulement pour Tori mais aussi pour les autres communes environnantes car c'est grâce à nos activités ~~agré~~ agricoles que nous approvisionnons les autres communes en vivre et surtout d'ananas. Ce sera la fin de l'ananas qui ne pousse que sur des terres spécifiques et ici, dans notre milieu c'est la terre de l'ananas depuis nos ancêtres?

- Le projet va engendrer aussi le vol pour ne pas dire la recrudescence du vol et de la criminalité qui a déjà commencé depuis que la majorité de nos terres nous ont été arrachées avec le projet de l'aéroport.

- Le projet va amener des problèmes de santé avec la poussière, les gaz Or nous n'avons pas et



- n'auront plus les moyens pour nous soigner.
- Le projet va nous faire perdre toute notre dignité d'homme et amènera la honte
- Le projet n'amènera aucun bien à Ton  
car nous avons appris à faire l'agriculture  
et rien d'autres. même à l'âge avancé,  
la population s'adonne encore à ses activités  
agricoles pour pouvoir s'assurer. Nous n'avons  
appris rien d'autre. Un paysan ne travaille  
pas à l'aéroport ou dans une Zone Economique  
Spéciale (ZES). Rien ne nous entoure.
- Le projet ne peut avoir aucun impact  
positif pour nous, habitant de Ton - Cada.  
C'est notre mort programmée avec ce projet.
- Avant le démarrage de tout projet, les promoteurs  
promettent monts et vallées ou à la population  
riveraine, mais quand ça démarre plus rien?  
Toutes les promesses deviennent du vent!
- Nous ne voulons pas de ce projet ici à  
Ton - Cada mais si l'Etat doit mettre à  
exécution ce projet ici par dictature et autoritarisme,
- qu'il prenne soin de ne plus nous gruger  
comme pour le projet de l'aéroport.
- Que les paysans soient dédommages avec justice  
et équité selon la valeur réelle des terres.
- Il faut que la Population affectée par ce projet



est la relève de la main d'œuvre locale (5)  
c'est-à-dire si le projet a besoin de main  
d'œuvre, il faut qu'il s'adresse à nos autotels  
locaux d'abord et que cette main d'œuvre  
soit recrutée dans la population affectée.

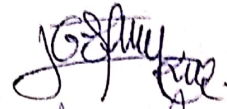
La population majeure que dans le cadre  
de ce projet que leur localité puisse bénéficier  
de :

- De la construction de centres de santé,
- Du recrutement de la main d'œuvre  
locale à 150% car leurs enfants qui ont  
étudié ont des compétences qui peuvent  
servir dans ce projet.
- De la sauvegarde de l'emploi des paysans  
en leur construisant ou en créant pour eux  
des centres de travail dans le domaine agricole
- De reprofilage à temps réguliers  
des routes dans le milieu
- De la construction de marché pour dans  
le milieu
- De la dotation du milieu en aménagement  
hydraulique
- De l'électrification du milieu
- De l'implantation dans le milieu de poste  
de police.

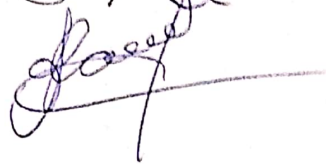
La séance a pris fin après une synthèse  
avec la population à 17h30mn.

Ont signé

Sylvie KPODSED  
Sociologue



Germaine ATINDEGLA  
Sociologue



AVOCETIEN Jean-Marie  
ressortissant Gbétaga



ADANDOSSOSSI Gafarou  
ressortissant sogbè



Pierre TOPHEMOUN  
ressortissant zèbè



DAGA Victorin  
ressortissant zèbè



TOKANNOU Eric  
ressortissant Dokanmè



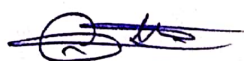
BOGLO Julien  
ressortissant zèbè



DAGA Rigobert  
chef village



ODOU Narcellin  
chef village Dokanmè



V

## **Compte Rendu situation à l'arrondissement de Tori- Cada dans la Commune de Tori- Bossito**

**Date/ heure :** 11/11/19 de 15h30 à 17h45

**Lieu :** Arrondissement de Tori –Cada dans la Commune de Tori- Bossito

**Responsable compte rendu :** Sylvie KPODJEDO

**Références liste de présences** (en PJ)

**Objet de la visite :** Présenter le projet aux populations et recueillir leurs perceptions, attentes, craintes, suggestions et recommandations.

### **Références photos associées**



Photos consultation Publique

- La consultation Publique à l'Arrondissement de Tori – Cada dans la commune de Tori – Bossito, a été très houleuse. Car la population a accueilli la nouvelle du projet avec une grande hostilité. Elle ne veut pas en entendre parler.
- Le Chef d'Arrondissement n'a pas assisté à la séance de consultation Publique et à notre appel a juste répondu qu'il était occupé ailleurs qu'il viendrait rattraper la séance mais il n'est jamais venu.
- La population et les autorités locales notamment les chefs village ont exigé que les limites exactes du site du projet leur soient montrées.



# Consultation Riveraine TORICAYA

11/11/2019 à l'arrondissement Toricaya

## Liste de présence des participants

N°	NOM ET PRENOM(S)	FONCTION / PROFESSION	CONTACTS	SIGNATION
1	ADJIHANOU Blaise	électricien BT	96 22 57 50	
2	DAGA Victorin	Cultivateur	97 75 22 80	
3	ADJIHANOU André	cultivateur		
4	HOUNHOLIENAGNON	cultivateur		
5	ANLOU ANICET	chauffeur	94 27 41 6	
6	LALY Tchetchouenou	cultivateur	97 67 89 65	
7	CALY Cosme	chauffeur	67 61 69 90	
8	ADJIHANOU François	chauffeur	96 00 94 98	
9	OZOUN André	cultivateur	96 02 16 23	
10	OZOUN BIENVENUE	Soudeur	96 91 47 35	
11	HODOVO SIKIRU	cultivateur	96 08 47 28	
12	DANGBÉNON Pierre	cultivateur	66 28 51 49	
13	TOKANNOU Eric	cultivateur	97 53 81 98	
14	DISSOU Cyrille	cultivateur	98 17 11 89	
15	DISSOU Norbert	cultivateur	97 93 03 39	
16	GAGA Gisèle	manager	97 18 80 38	
17	ASSAHOUN AGBE	pêcheur		
18	BOSSOU BINJAMIN	chauffeur	96 13 02 09	
19	GRESSETO BENOIT	vendeur	96 00 92 15	
20	DIODJANNAN Felix	élève	97 02 27 78	
21	AGBIN FINAGNON	Mécanicien	66 00 93 58	
22	AVOCETIEN DAVID	cultivateur	97 42 76 23	
23	OBOU Marcelin	cultivateur	66 28 67 51	
24	ALLON Adrien	cultivateur	97 18 85 54	
25	AVOCETIEN seraphin	cultivateur	97 45 85 53	
26	KOKODJE Kou André		66 36 71 84	
27	OUNOHO Alexis	étudiant	96 75 61 56	
28	KOSSOU Plamin	cultivateur	62 52 78 63	



29	AKPOLI Alescambe	chauffeur	61 53 31 81	<del>Comp</del>
30	Wouèzoun Vo Gase	cultivateur		Refus
31	AGBIZIN BERNARD	cultivateur	97 64 90 76	<del>Ref</del>
32	TOTCHEMOU. Pierre	Cultivateur	96 13 29 00	Cyl
33	LALY Florent	cultivateur	66 07 06 99	<del>Ref</del>
34	AZANGBE Louis	cultivateur	97 93 60 96	AS
35	DAGA Christian	Producteur d'ananas	96 34 07 97	<del>Dug</del>
36	LALY Louis	cultivateur	97 78 07 00	<del>Ref</del>
37	HOUSSEOU Symphonie	cultivateur	97 52 15 75	<del>Cyl</del>
38	HOUESSINOM SAM	cultivateur	67 47 55 77	<del>Ref</del>
39	Togbe Pascal	cultivateur	66 85 4 46	<del>Ref</del>
40	BOGLO JULIEN	Maçon	36 00 75 69	<del>Ref</del>
41	DAGA RIGOBERT	cultivateur	97 65 75 63	<del>Ref</del>
42	SOUNOUVOU A.S.	chauffeur	96 00 92 68	<del>Ref</del>
43	KPOSSA Michel	cultivateur	76 51 48 64	<del>Ref</del>
44	ADANDOSSISSI G.	cultivateur	97 33 63 59	<del>Ref</del>
45	DAGA ANTOINE	cultivateur	97 15 14 60	<del>Ref</del>
46	AGBIN marthe	chauffeur	95 86 28 73	<del>Ref</del>
47	DISSEW BIENVENUE	cultivateur	97 34 36 69	
48	AVOCETIEN Jean	chauffeur	97 68 72 66	<del>Ref</del>
49	HOUNYÉ MICHEL	cultivateur	96 21 52 37	<del>Ref</del>
50	HOUEHA Amiel	maçon	97 87 30 56	<del>Ref</del>
51	DOKTO Guy	Barbier	66 82 51 90	<del>Ref</del>
52	AZANGBE Leopold	cultivateur	97 93 26 00	



## **Annex XII Summary of consultation activities in the districts of Tori-Cada and Tangbo-Djévié – preliminary consultations**

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*Synthèse des activités de consultation des parties prenantes organisées dans  
l'arrondissement de Tori-Cada et Tangbo-Djéviè, novembre 2019 à janvier 2020*

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La consultation du public est une étape importante et indispensable dans la réalisation d'une étude d'impact environnemental car elle permettra aux personnes, groupes ou village concernés par le projet d'avoir accès à l'information technique, d'exprimer leurs opinions sur le projet et de mettre en lumière, entre autres, les valeurs collectives qui doivent être considérées dans la prise de décision.

La consultation publique permet de vérifier s'il n'y a pas de conséquences imprévues à l'implantation d'un projet, et de ce fait, elle peut éviter des dépenses futures pour des correctifs environnementaux. En conséquence, les opinions du public jouent un rôle important dans la procédure d'évaluation des impacts sur l'environnement. De plus elle permet de procéder à un inventaire sommaire des biens et personnes affectées. Elle est distincte de la procédure d'audience publique.

La consultation publique, pour finir, permet d'asseoir l'appropriation et l'implication effective du projet dans toutes ses phases, par les populations concernées et de ce fait de mettre en place les mécanismes qui garantissent leur accompagnement, entre autres, social du projet.

Eu égard à tout ce qui précède, il est nécessaire de prendre suffisamment de temps pour consulter toutes les catégories d'acteurs concernés, notamment celles vivant dans les villages à proximité de la zone du projet ARISE INDUSTRIAL ZONE.

C'est dans ce cadre que plusieurs réunions et rencontres ont été réalisées avec les populations, les groupements communautaires socio-économiques, les Organisations de la Société Civile (OSC), et les autorités locales des Arrondissements de TORI-CADA et de TANGBO DJEVIE qui abritent le site du projet. Ces réunions ont pour but principal, d'informer la population sur le projet (consistance, délimitation, conséquences pour les riverains), et de recueillir leurs perceptions et opinions. Les procès-verbaux des diverses réunions ainsi que la liste des personnes rencontrées se trouvent dans les annexes du présent rapport.

De l'analyse des résultats de la consultation publique et des focus groupes voici la synthèse des perceptions, craintes et suggestions de chaque cible à TORI-CADA.

# 1. ARRONDISSEMENT DE TORI-CADA

## 1.1. Entretien avec les chefs villages, conseillers et personnes ressources de Tori-Cada

La rencontre avec les chefs villages, conseillers et personnes ressources a permis de recueillir leurs perceptions, craintes et suggestions par rapport au projet ARISE.

De l'analyse de ces résultats, il ressort que ces autorités reconnaissent que ce projet contribuerait au développement des localités concernées mais leurs plus grandes inquiétudes résident dans le sort qui sera réservé à la population qui est à 90% agriculteurs et qui a besoin de terres pour mener à bien ses activités. Ces dernières à qui le projet de l'aéroport a déjà pris une grande part des terres et qui n'a pas fini de soigner ses meurtrissures selon leur dire. Comme les autres couches enquêtées ces populations ont émis leurs perceptions, craintes et suggestions sur ledit projet.

### 1.1.1. Perceptions chefs villages, conseillers et personnes ressources

Ce projet serait le bienvenu, si cela ne devait pas prendre encore des terres aux agriculteurs. Certes cela peut permettre le développement du village. Ce qui conduirait à une amélioration des conditions de vie des populations environnantes. Et pour ce faire, le projet de l'aéroport a déjà fait miroiter tout cela à la population.

Ce projet sera un projet de plus. Car en prenant les terres dans le cadre du projet de l'aéroport de Glo, l'Etat a déjà dit que dans 3028 ha prises dans ce cadre, il y aura aménagerait une zone spéciale industrielle selon les personnes rencontrées. Pour eux, d'où vient encore ce projet qui doit encore prendre d'autres terres. C'est un projet qui va causer beaucoup de tort aux habitants dont l'activité principale n'est rien d'autre que les travaux champêtres.

Ces terres constituent l'héritage reçu des ancêtres. Pour eux c'est la seule chose qu'ils savent faire. Et si des projets doivent venir leur prendre leurs terres, comment les habitants de ces villages vont-ils subvenir aux besoins de leurs familles respectives. Certes le projet ne prend pas en compte le centre des villages habités. Mais c'est dans la zone du projet que la population tire son gagne-pain. En prenant encore à la population le peu de terre qui restent à la pratique de l'agriculture, c'est l'obliger à s'exiler vers d'autres terres du coup les déraciner de leurs cultures initiales. Ceci entraînera la dislocation des familles et des cultures. Ces derniers demandent une compassion de la part de l'Etat.

#### 1.1.1.1. Craintes des chefs villages et personnes ressources

Les chefs villages, leurs conseillers et personnes ressources ont émis des craintes que voici :

- Le non-dédommagement des terres à leurs justes valeurs,
- Les gaz d'échappements des machines et les pollutions vont entraîner des maladies,
- La perte des terres des personnes affectées et de tout ce qui s'y trouve,
- Le délogement des villageois qui va entraîner la destruction des cultures et des familles,
- La faim et la famine dû à la non-disponibilité des terres cultivables,
- Le vol, la délinquance, le braquage, la criminalité dû à l'oisiveté,
- Le déshonneur dû à l'incapacité des chefs familles à satisfaire les besoins fondamentaux de la famille,
- La mort par souci de beaucoup de personnes dépouillées de leurs terres,

- Les divorces et la prostitution dû à la non-satisfaction des besoins des femmes.

#### 1.1.1.2. Suggestions des chefs villages et personnes ressources

Les chefs villages et personnes ressources pensent que si malgré leur rejet le projet devrait être fait, il faut :

- Le dédommagement réelle et justes des propriétaires et exploitants
- La construction d'infrastructures dans les villages à proximités du site de projet : Construction de centre de santé, d'école (collège), d'adductions d'eau, de marchés, de maison de jeunes, de terrain de sport.
- La construction de poste de police dans les villages
- Le recrutement des agriculteurs affectés par le projet et tous ceux qui ont un besoin de job dans les villages,
- L'électrification des villages affectés,
- La construction de routes et pistes dans les villages



PJ : focus dokanmè



PJ : focus zèbè



PJ : photo focus Sogbé



PJ : photo focus Gbétaga

PJ : photo entretien avec les chefs villages et personnes ressources TORI-CADA, Novembre 2019

## 1.1. Entretien avec les jeunes

D'une manière générale les jeunes de TORI-CADAs'organisent en association de jeunes, d'agriculteurs, d'artisans ou d'artistes. Ces associations n'ont pas de domaine sur le site du projet ARISE-BENIN INDUSTRIAL ZONE. Mais certains des membres possèdent des terres ou ont loués des terres dans le domaine. Ils n'ont pas de siège mais font leurs réunions au niveau des places publiques et sont tous riverains au site du projet ARISE.

D'un point de vu global, les jeunes de la commune de TORI-CADAn'ont jamais entendu parler du projet ARISE-BENIN INDUSTRIAL ZONE. Ils ont eu cette nouvelle par le biais de l'équipe sociale de ANTEA group. La nouvelle reçu, les jeunes des villages concernés par le projet sont pour la plupart conscient que ce projet pourrait contribuer au développement de leurs villages respectifs. Par ailleurs, le sort des agriculteurs qui pour la plupart n'ont d'autres sources de revenus que leurs terres demeurent la plus grande préoccupation.

En effet la grande majorité des jeunes ont pour activités génératrices de revenus, l'agriculture. Ces derniers ont pour la plupart acquis des terres par héritage, achats ou locations pour mener leurs activités.

### 1.1.1. Perceptions

Ayant appris la nouvelle de la venue du projet leurs réactions a été pratiquement le même ; Ils ne veulent pas ce projet qui vient une fois de plus leurs arrachés leurs terres qui constituent leur principale source de "gagne-pain". Pour eux ils sortent à peine des " calvaires du projet de l'aéroport de Glo "où l'Etat leurs a pris plusieurs hectares de terres et n'a pas selon leur dit dédommager les propriétaires de ces terres, et ceux qui ont reçu de dédommagement ne l'ont pas été à la juste valeur des terres. Et maintenant un autre projet qui va encore leur prendre le peu de terres cultivables qui reste ! Ces derniers pensent que l'Etat peut faire preuve de compréhension et de compassion à leurs égards et chercher l'espace qui lui faut pour ce projet dans le périmètre définis pour l'aéroport. Autrement cela devient de l'acharnement de sa part envers les populations de ces villages qui ont déjà été expropriés de plus de six cents (600) hectares de leurs terres lors de la délimitation du projet de l'aéroport.

### 1.1.2. Craintes des jeunes

Les craintes exprimées par les jeunes par rapport au présent projet sont multiples et diverses. On peut citer :

- La non prise en considération des préoccupations de la population
- Le non-dédommagement des propriétaires, à la vraie valeur de leurs terres
- Le non-recrutement des agriculteurs qui sont à 90% analphabètes pour intervenir dans les travaux de mains d'œuvre sur le site
- La faim et la famine pouvant survenir dans ces villages suite à la non-disponibilité de terres cultivables
- Le vol et la délinquance dû à l'oisiveté
- La prostitution des jeunes filles et des femmes dû à l'incapacité des maris à subvenir désormais à leurs besoins
- La maladie et la mort par souci de certains agriculteurs
- Les maladies du fait des diverses pollutions que pourrait engendrer la mise en œuvre du projet.

### 1.1.3. Suggestions

Les jeunes de TORI-CADAdisent ne pas vouloir du projet ARISE mais estiment néanmoins que si le projet devrait avoir lieu malgré leurs rejets, il faut tenir comptes de certains paramètres. Ces paramètres se déclinent en suggestions que voici :



- Trouver un emplacement pour abriter le projet ARISE-BENIN INDUSTRIAL ZONE dans le site du domaine de l'aéroport
- Dédommager toutes les personnes affectées par le projet avant tout démarrage des travaux
- Permettre aux exploitants de pouvoir récolter leur culture en cours surtout l'ananas dont la période de maturité s'étend sur deux (2) ans. Ne pas détruire les cultures comme dans le cas de l'aéroport.
- Prioriser la main d'œuvre locale et recruter en premier lieu les fils du village qui ont des diplômes et compétences requises pour les constructions sur chantier.
- Penser à la construction d'infrastructures dans les villages impactés tels que l'accès à l'eau, à l'électrification, aux centres de santé, aux voies et pistes routiers, aux marchés, centre de loisirs et de sports etc.
- Trouver à faire aux agriculteurs qui seront sans activité faute de terres cultivables
- Démarrer réellement une fois que les conditions préalables sont remplies et éviter de prendre les terres aux agriculteurs et les laisser en jachère sans rien y faire.
- Eviter de courtiser les femmes mariées du milieu. Ceci fait partis des interdits des populations de ce milieu.

**PJ : photo focus jeune Zèbè 1**



**PJ : photo jeune zèbè 2**



**PJ : Photo focus jeune Dokanmè 1**



**PJ : focus jeune Dokanmè 2**



**PJ : Photo entretien avec les jeunes TORI-CADA, Novembre 2019**

## **1.1. Entretien avec les femmes**



La plupart des femmes rencontrées n'ont pas reçue d'instruction scolaire. Celles qui ont fréquenté l'école ont le niveau primaire ou secondaire. La majorité des femmes sont des ménagères, des commerçantes, travaillent dans les champs comme ouvrières et/ou font la transformation des produits agro- alimentaires.

Les femmes se marié très tôt entre quinze (15) et dix-huit (18) ans. Les activités menées par ces dernières sont la transformation de manioc en gari, de noix de palme en d'huile rouge, la culture et la récolte d'ananas, la vente d'ananas, de tubercules, de maïs, d'huile de palme et des produits issues des récoltes. Dans ces foyers c'est le mari qui est le chef de ménage et à la responsabilité de prendre les grandes décisions qui engagent la vie de sa famille quoique la discussion est menée avec sa femme d'abord.

La femme garde l'argent issus de ses activités. Mais pour les dépenses peut demander l'avis du mari.

A TORI-CADAlles femmes n'héritent pas des terres laissées par leurs maris en cas de décès. Ce sont les enfants qui héritent des biens de leur père défunt. Avant les fils avaient plus de droit que les filles. Aujourd'hui avec la nouvelle loi en vigueur au Bénin en ce qui concerne l'héritage, un effort est fait afin que les filles héritent de la même manière que les garçons. Seules les femmes d'un certain âge, jugés sages, participent aux décisions prises dans le village. Pour le reste, On peut leur faire appelle seulement quand le sujet les concerne.

Les femmes de la commune de TORI-CADAn'étaient pas informées du projet ARISE-BENIN INDUSTRIAL ZONE et n'en n'ont entendu parler que par le biais de l'équipe sociale de ANTEA group. Les femmes des villages concernés par le projet ont pour la plupart conscience que ce projet pourrait contribuer au développement de leurs villages respectifs. Leurs perceptions craintes et suggestions se structurent comme suit :

### **1.1.1. Perceptions**

Les femmes pensent que c'est un bon projet qui pourrait apporter une modernisation des villages concernés. Néanmoins ce projet privera les populations de leurs terres cultivables. Or l'agriculture est l'activité principale des hommes du village. Ceci les amène à l'expression de leurs préoccupations quant au sort réservé aux hommes qui ne sont rien d'autres que leurs maris.

### **1.1.2. Craintes**

- La peur que les terrains de leurs maris leur soient arrachés sans un dédommagement conséquent comme dans le cadre du projet de l'aéroport ;
- Le non-recrutement de la main d'œuvre locale ;
- Le spectre de la famine, du vol, de la criminalité, de la mort qui plane sur le village avec ce projet.

### **1.1.3. Suggestions**

Les femmes suggèrent :

- Que le promoteur s'arrange pour trouver aux hommes des terrains agricoles afin de leur permettre de poursuivre leurs activités agricoles
- Le recrutement de tous ceux qui vont perdre leurs activités du fait du projet et le dédommagement de façon juste des personnes affectées
- Le recrutement de la main d'œuvre féminine,
- La construction de routes, de centre de santé, de marché, d'adduction d'eau, de centre de loisir, l'électrification du milieu etc.

Les femmes de la commune de TORI-CADAdisent n'avoir jamais entendu parler du projet ARISE INDUSTRIAL. Ils ont eu cette nouvelle par le biais de l'équipe sociale de ANTEA group. Les femmes des villages concernés par le projet ont pour la plupart conscience que ce projet pourrait contribuer au développement de leurs villages respectifs. Voici leurs perceptions craintes et suggestions



PJ : Photo focus femme Dokanmè 1



PJ : Photo focus femme Dokanmè 2



PJ : Photo focus femme Sogbé



PJ : Photo focus femme Sogbé

Entretien femmes TORI-CADA, Novembre 2019

## 1.1. Entretien avec les exploitants agricoles, les éleveurs et propriétaires terrien

Les exploitants peuvent être des agriculteurs (exploitants ou locataires de terres), des propriétaires ou des éleveurs. L'exploitation directe se fait par le propriétaire qui cultive lui-même son champ, avec s'il le faut l'aide des ouvriers qu'il recrute pour des tâches ponctuelles. La location consiste à ce que le propriétaire loue son champ à un tiers qui veut l'exploiter. Ces terres sont acquises par héritage, achat ou location. Les exploitants qui constituent les personnes affectées par le projet ARISE ont aussi exprimés leurs perceptions, craintes et suggestions.

### 1.1.1. Perceptions

Les exploitants pensent que partout où il y a projet, il y a développement. Mais avec le projet de l'aéroport ils ont vécu une très mauvaise expérience qui les amène à ne plus croire dans les avantages d'un projet pour leur localité.

Ils ne veulent pas de ce projet. Même s'ils reçoivent des milliards, ils préfèrent garder leurs champs hérités de leurs ancêtres et qui offrent l'avantage de les nourrir aujourd'hui et nourrira leurs enfants demain.

« Nous ne savons rien faire d'autres que les champs. C'est ça que nous avons appris à faire. Nous préférons garder nos champs ».

### 1.1.2. Craintes

Après la présentation du projet, la seule représentation de se voir dessaisir de leurs terres cultivables, sources de leurs subsistances, poussent les exploitants agricoles à faire étalage de leurs préoccupations qui se structurent comme suit :

Ce projet c'est notre mort programmée car il va engendrer beaucoup de dégâts au niveau de notre population. Avec ce projet, il y aura :

- La faim et la famine car nous n'aurons plus de sources de revenus.
- Le vol, la recrudescence de la criminalité dû à l'oisiveté
- La dislocation des familles, de l'organisation sociale,
- La perte des normes et valeurs culturelles,
- La prostitution des femmes dû à la non-satisfaction de leurs besoins par les maris qui n'auront plus aucun pouvoir économique, s'ensuivront les divorces.
- La mort dû aux soucis.

### 1.1.3. Suggestions

Les exploitants des terres proposent tout simplement que l'Etat trouve d'autres sites pour abriter ce projet. Epargner ainsi le reste de leurs terres car ils ont déjà cédé une partie de leurs terrains dans le cadre du projet de l'aéroport de Glo.



PJ : Photo focus exploitants 1



PJ : Photo focus exploitants 2

Photo entretien avec les exploitants TORI-CADA, novembre 2019

## 1.1. Entretien avec les personnes vulnérables

La plupart des personnes vulnérables sont riverains ou ont des terres dans l'emprise du projet. Ces terres sont acquises par héritages, achats ou locations. Ces personnes vulnérables se sont aussi prononcées sur le projet ARISE en donnant leur perceptions, craintes et suggestions.

### 1.1.1. Perceptions

Pour les personnes vulnérables, les terres sont les seules richesses des habitants de ces villages. Et c'est grâce à la culture dans les champs que la plupart des habitants subvient aux besoins de leurs familles. Parmi les personnes handicapées malgré leurs handicaps certains louent des terres ou sont propriétaires de terres qu'ils cultivent. Et c'est cette activité qui permet de nourrir les familles. Ces derniers ont posé beaucoup de questions sur le devenir des agriculteurs et exploitants et sur comment nourrir les familles après les avoir dessaisis de leurs terres. Maintenant voilà qu'aujourd'hui l'Etat dit vouloir prendre ces terres pour ce "projet ARISE". Pour ces derniers, ce sera vraiment difficiles de s'en sortir sans terres cultivables.



### 1.1.2. Craintes

Quelques craintes émises par les personnes handicapées :

- Le non-dédommagement des propriétaires et exploitants à la juste valeur de leurs biens et équipements
- Le détournement du projet à d'autres fins
- L'expropriation des exploitants et le non-démarrage effectif des travaux dans le temps. Ce qui risque de laisser la population riveraine sans travail car beaucoup d'ouvriers agricoles tirent leurs revenus de subsistances des jobs dans les Champs
- La faim et la famine dû à la non-exécution des travaux champêtres qui aident beaucoup la population à nourrir sa famille
- Les décès qui pourraient être causés par des soucis des agriculteurs et exploitants

### 1.1.3. Suggestions

Les suggestions des personnes vulnérables en ce qui concerne le projet ARISE se déclinent comme suit :

- Penser à indemniser les populations à la juste valeur de leurs terres
- Recruter la main d'œuvre locale
- Profiter de cette opportunité pour venir en aide aux personnes vulnérables notamment les personnes handicapées des villages concernés en les dotant de tricycles et en leur trouvant des subventions pour leurs soins en santé.

PJ : photo focus personnes vulnérables 1



PJ : photo focus personnes



Entretien personnes vulnérables TORI-CADA, Novembre 2019

## 1.1. Entretien avec les artisans et commerçants

Les artisans et commerçants ont pour la plupart leurs ateliers et boutiques dans le centre des villages. Pas d'ateliers et commerce sur le site du projet. La plupart des ateliers et commerces sont loués. Les principales activités exercées dans l'emprise et à proximité du site sont le commerce (vente de divers, d'ananas, de maïs, huile de palme, de bananes, de papayes, de manioc et patates douces, d'arachides de tomates, de piments, des animaux domestiques etc...), artisanat (coiffure, couture, menuiserie, soudure, mécanique auto et moto, maçonnerie, tissage, électricité, forge, ferraille etc.), agriculture (culture d'ananas, de manioc, de maïs, de bananes, de palmier, d'haricot, d'arachide etc.). Ces activités peuvent être saisonniers ou permanentes.

Approchés ces commerçants et artisans ont donné leur perceptions, craintes et suggestions par rapport au projet ARISE.

### **1.1.1. Perceptions**

Pour les commerçants et artisans ce projet pourrait être la bienvenue. Il pourrait apporter le développement du village. Mais l'agriculture est la seule activité menée par la plupart des habitants de ce village. Si le projet prend les terres des paysans qu'advient-il des commerçants et artisans ont-ils exprimés. Ce sont les produits issus de l'agriculture que la plupart des commerçants vendent le plus. Les artisans aussi trouvent du travail si le paysan est heureux. Pour ces derniers les agriculteurs ont besoins de terres pour produire les cultures vivrières et permettre aux commerçants de pouvoir mener leurs activités car ce sont ces produits qu'ils vendent la plupart du temps.

### **1.1.2. Craintes**

Pour les commerçants et artisans, l'Etat a déjà pris des domaines dans le cadre du projet de l'aéroport de GLO et a détruit les cultures en cours sur ces parcelles. L'Etat a interdit toute culture sur ces terres. Mais jusqu'à présent le domaine est resté sans travaux. Les travaux pour lesquelles la population a cédé ses terres n'ont pas démarré. Dans ce cadre ces derniers espèrent que le projet ARISE- BENIN IZ ne suivra pas ce même processus.

Cette frange de la population craint que :

- La tromperie du promoteur du projet qui derrière l'illusion d'un projet de zone économique spécialisée qui leur est présentée, ne veut que les dessaisir de leur terre pour d'autres fins inavouées.
- La main d'œuvre locale ne soit priorisée dans le cadre du projet.
- L'accessibilité du site soit interdite aux femmes pour y écouler leurs marchandises au cours de la phase de construction.

### **1.1.3. Suggestions**

Avant les travaux :

- L'indemnisation de la population affectée à la juste valeur de leur terre avant le démarrage de tout travaux sur le site.
- L'identification et le relogement de la population dans leur commune d'origine "Tori " afin de pouvoir rester proche de leur valeur culturelle.
- Le recrutement de la main d'œuvre locale au cours des différentes phases du projet ;
- L'électrification des villages environnants
- La construction de centre de santé dans les villages
- La construction d'adduction d'eau dans les villages impactés afin de régler leur problème d'accessibilité à l'eau courante ;
- La construction de marchés pour les femmes
- La construction des voies et pistes d'accès au village.



PJ : Photo focus artisans et commerçants 1



PJ : Photo focus artisans et commerçants 2

Entretien artisans, commerçants TORI-CADANovembre 2019

## 1.1. Entretien avec les organisations de la société civile

### 1.1.1. Perceptions

Ce projet pourrait apporter une modernisation du village de part, l'électrification du milieu, l'accès à l'eau, les routes plus praticables, de l'emploi pour quelques-uns. Mais l'agriculture est l'activité principale menée par la plupart des habitants de ce village. Si le projet prend les terres des paysans qu'advient-il des habitants de ces villages ont-ils exprimés. Pour eux les populations sortent à peine des "calvaires du projet de l'aéroport de Glo" où l'Etat leurs a pris plusieurs hectares de terres et n'a pas selon eux, dédommager les propriétaires de ces terres à sa juste valeur. Et maintenant un autre projet qui va encore leur prendre le peu de terres cultivables qui leur reste. Ces derniers pensent que l'Etat peut faire preuve de compréhension et de compassion à l'égard de ces personnes et chercher l'espace qui lui faut ailleurs.

### 1.1.2. Craintes OSC

Ce projet entrainera dans les villages selon les organisations de la société la faim et la famine. Ce qui poussera la population à la délinquance, au vol, à la prostitution. Les maladies qui subviendront du fait de la pollution. Le déshonneur des chefs familles du fait l'incapacité à subvenir aux besoins de leurs familles. Ce qui peut entrainer la mort par souci.

### 1.1.3. Suggestions

Que le site du projet soit déplacé ailleurs dans une partie du domaine de l'aéroport par exemple ont exprimés les OSC.



## 2. ARRONDISSEMENT DE TANGBO-DJEVIE

Dans cet arrondissement en plus de la consultation publique, et des consultations avec les autorités locales, différents groupes spécifiques ont été rencontrés soit en focus soit en discussion de groupe en vue de leur présenter le projet, recueillir leurs appréciations, craintes et suggestions sur celui-ci.

### 2.1. Entretien avec les chefs villages, conseillers et personnes ressources de Tangbo Djevie

Les entretiens avec chaque chef- village leurs conseillers, les sages et les chefs religieux dans les villages de Houézè, Djitin- Aga et Anavié dans l'arrondissement de Tangbo-Djèvié, commune de Zè ont permis de recueillir leurs perceptions, leurs attentes, leurs craintes mais également leurs suggestions et recommandations.

L'analyse et la synthèse de ses entretiens, révèlent que ces autorités reconnaissent que ce projet est un projet de développement et pourrait contribuer au développement des localités riveraines au site de son implantation. Cependant, le projet suscite auprès de ces autorités un rejet systématique.

En effet, profondément marqué par les circonstances dans lesquelles s'était déroulée l'expropriation des Personnes Affectées par le Projet (PAP) de l'aéroport de Glo-Djigbé et les conséquences que les populations continuent de gérer jusqu'à nos jours, les autorités locales ont évoqué diverses raisons empiriques pour lesquelles même pour des "milliards, ils ne sont plus prêts à céder leurs terres pour quelques projets que ce soit de l'Etat".

Voici comment se structurent les perceptions, craintes et suggestions des autorités locales par rapport au projet de zone industrielle.

#### 2.1.1. Perceptions

Les autorités locales, tout en commençant à reconnaître que la terre appartient à l'Etat, attire l'attention sur le fait que dans le cadre du projet de l'aéroport de Glo-Djigbé l'Arrondissement de Tangbo a déjà été exproprié d'environ 1700 hectares dans des circonstances où les populations se sont senties flouées.

Pour ces autorités :

- On n'initie pas une zone industrielle auprès des agglomérations mais sur des sites non habités. Le site choisi, même si c'est situé dans le domaine agricole de nos villages, est environné d'habitations. Et si le projet va s'installer vraiment là, c'est que bientôt, les villages vont devoir être éradiqués de son environnement ;
- Le site choisi, est un domaine de l'ananas. C'est un produit qui ne pousse pas partout. Et dans l'arrondissement choisie, il y a une forte production de l'ananas. A un moment où l'Etat envisage de faire la promotion de l'ananas, pourquoi ce site ? c'est paradoxal au projet du gouvernement ;
- La quasi-totalité des populations de l'arrondissement de Tangbo- Djèvié, sont des agriculteurs, et vivent des produits de leurs travaux champêtres. Ils ne savent rien faire d'autre et n'ont rien appris d'autre que l'agriculture. C'est grâce à leurs activités agricoles que les familles survivent, que les enfants vont à l'école, etc. ;
- Toutes les terres environnantes sont actuellement vendues. Si le projet de zone économique vient à exproprier cette population, ce sera" un drame social encore plus grave que celui de

l'aéroport de glo". Car il va s'installer chez les riverains ;" la famine, la délinquance, la dislocation et la destruction des familles, la perte des valeurs culturelles, les maladies, la mort par soucis ;

- Toutes les PAP du projet de l'aéroport de Glo-Djigbé, n'ont jusque-là pas encore été réinstallées, fautes d'espace. Certains n'ont pas encore été dédommagés ;
- La plupart de ceux à qui les dédommagements "forfaitaires" ont été donnés, sont venus s'acheter d'autres terres à côté. Ainsi tout en restant dans leur arrondissement, ils pourront toujours s'adonner à leurs activités agricoles ;
- Au regard de comment l'expropriation dans le cadre du projet de l'aéroport s'est déroulée, il est impossible de faire "confiance en un projet d'Etat" et cela "même pour des milliards" il est préférable de garder les terres agricoles, qui constituent la garantie d'un avenir économique et psychologique durable et certain pour les populations ;
- Le projet ne saurait être le bienvenu dans l'arrondissement de Tangbo - Djèvié pour toutes les raisons précitées. Cet arrondissement a déjà été gratifié du projet de l'aéroport. C'est largement suffisant. Surtout au regard de tous les problèmes sociaux que ce projet a engendré pour la population expropriée ;
- Ce nouveau projet n'apporterait aucun impact positif aux localités impactées et ressemble à un acharnement de l'Etat envers la population de l'arrondissement. Et à moins que réellement, " l'Etat ne veuille en finir avec la population de Tangbo- Djèvié," et les "éradiquer de la carte du Bénin", qu'il fasse un peu preuve de pitié et de compassion envers "nous" et trouve un autre site à ce projet de zone industrielle ;
- Dans le PDC de la commune de Zè, il est prévu une zone économique dans la localité de Adjan. La zone économique peut être déplacer là-bas pour le bonheur et la quiétude de tous. Ou mieux encore, la zone dite de palmeraie sise à Dodji qui a été arrachée aux populations depuis des dizaines d'année et qui est restée inexploitée jusqu'ici, peut aussi abriter un tel projet

### 2.1.2. Craintes

Les chefs villages, leurs conseillers et les sages et chefs religieux ont émis des craintes que voici :

- Quel sera le sort qui sera réservé aux Populations des villages dont les champs sont impactés vu que c'est une population principalement agricole ;
- La proximité de zone industrielle des villages environnants va à la longue engendrer le déplacement de ces villages ;
- Il n'existe plus de terres proches pour accueillir les PAP, toutes les terres ont été vendues ;
- Le délogement des villageois va entraîner la destruction des familles, des mœurs et coutumes,
- Le projet va engendrer la famine dû à la non-disponibilité des terres cultivables, Le vol, la délinquance, le braquage, la criminalité dû à l'oisiveté, Le déshonneur dû à l'incapacité des chefs familles à satisfaire les besoins fondamentaux de la famille, La mort par souci de beaucoup de personnes dépouillées de leurs terres.

### 2.1.3. Suggestions

Seules les autorités d'un village sur les 4 entretenus, pensent que si malgré leur rejet le projet devrait être fait, il faut :

- Procéder à un dédommagement réel et justes des propriétaires et exploitants ;

- Doter les villages à proximités du site du projet de la construction d'infrastructures : telles que ; les centres de santé pour prendre en charge les malades, d'école là où il n'y en a pas, d'électricité, de marchés, de maison de jeunes, de terrain de sport ;
- La construction de postes de police dans les villages ;
- Le recrutement prioritairement des enfants des agriculteurs affectés par le projet et tous ceux qui ont un besoin de job dans les villages ;
- La construction de routes et pistes dans les villages.



Photo focus Houézè



Photo focus Djitin Aga



Photo focus Anavié

Figure 1 : Entretiens avec les chefs de village, conseillers et chefs religieux

## 2.2. Entretien avec les artisans et commerçants

L'entretien avec les artisans et commerçants de l'Arrondissement de Tangbo- Djèvié de même que nos observations sur le terrain ont révélé que la plupart des ateliers et boutiques de cette cible, sont situés dans le centre des villages et de l'arrondissement et non dans l'emprise du site du projet industriel. Ces ateliers et boutiques des artisans et commerçants sont loués et les principales activités qui s'y exercent sont le commerce (vente de divers produits de consommation courante, d'ananas, de maïs, huile de palme, de bananes, du pastèque, de papayes, de manioc et patates douces, du tarot, d'arachides de tomates, de piments, d'animaux domestiques, etc...), artisanat (coiffure, couture, menuiserie, soudure, mécanique auto et moto, maçonnerie, tissage, électricité, forge, ferraille etc.), agriculture (culture d'ananas, de manioc, de maïs, de bananes, de palmier, d'haricot, d'arachide etc.).

Dépendamment des produits vendus (dans le cas du commerce), et Ces activités peuvent être saisonnières et dans le cas des artisans, elles sont permanentes.

Les perceptions, craintes et suggestions des commerçants et artisans par rapport au projet se présentent comme suit :

### **2.2.1. Perceptions**

- Ce projet va consacrer la fin de l'arrondissement, car l'agriculture est la seule activité menée par la plupart des habitants des villages de l'arrondissement ;
- Si le projet prend les terres des agriculteurs, « qu'advient-il d'eux et de nous commerçants et artisans ? » ;
- Ce sont les produits issus de l'agriculture que la plupart des commerçants vendent le plus. Quant aux artisans ce sont les habitants de cet arrondissement qui sont nos clients. S'ils ne peuvent plus pratiquer les activités agricoles qui constituent leurs ressources où trouveront ils l'argent pour lancer des commandes ? nous disparaîtrons avec eux. Si ces derniers n'ont plus de terres où iront-ils labourer ? et puis, nous aussi, nous sommes aussi des agriculteurs ;
- Toute la commune est en pleure depuis la nouvelle du projet de la zone industrielle. Les agriculteurs ont déjà perdu une grande partie de leurs terres dans le cadre du projet de l'aéroport de Glo, maintenant avec ce projet de zone industrielle, qui va engendrer encore l'expropriation du reste des terres des paysans !!! Vraiment c'est difficile.

### **2.2.2. Craintes**

Pour les commerçants et artisans, l'Etat a déjà pris des terrains dans le cadre du projet de l'aéroport de Glo et a détruit les cultures en cours sur ces parcelles. L'Etat a interdit toute culture sur ces terres. Mais jusqu'à présent le domaine est resté sans travaux. Les travaux pour lesquelles la population a cédé ses terres n'ont pas démarré. Dans ce cadre ces derniers espèrent que le projet ne suivra pas ce même processus.

Les craintes de cette frange de la population sont les suivantes :

- Que l'installation de la zone industrielle, soit la première étape du déguerpissement de la totalité de la population de l'arrondissement car une zone industrielle ne s'établit pas en agglomération ;
- Que la main-d'œuvre locale ne soit pas priorisée dans le cadre du projet ;
- Qu'une fois le projet installé, le promoteur ne respecte plus aucun de ses engagements envers la population ;
- Que comme dans le domaine de l'aéroport, le dédommagement ne soit pas conséquent

### **2.2.3. Suggestions**

Ce groupe souhaiterait :

- Que dans la mesure du possible l'Etat se trouve un autre site pour implanter son projet de zone Industrielle, « nous nous n'en voulons pas dans notre localité. Même pas pour de l'argent car c'est notre mort si nous l'acceptons, la perte de notre dignité et de notre honneur » ;
- Nos terres nous sont chères et valent plus que de l'argent. L'argent fini, mais la terre, elle, ne ment pas ;

- Que les promoteurs trouvent d'autres domaines pour ce projet et que l'Etat laissera les habitants de Tangbo-Djèvié déjà meurtris par les événements de la prise des terres dans le cadre du projet de l'aéroport en paix ;
- Si ce projet doit avoir lieu malgré tout, que les populations affectées soit dédommagé à la juste valeur de leur terre ;
- Que le recrutement de la main d'œuvre locale soit priorisé.



Figure 2 : Artisans commerçants de Zè

## 2.3. Entretien avec les exploitants agricoles, les éleveurs et propriétaires terriens

Les exploitants agricoles, les éleveurs et les propriétaires terriens constituent la cible la plus importante de notre étude, non pas, par leur effectif mais plutôt parce qu'elle constitue la principale population affectée par le projet ARISE INDUSTRIAL ZONE car ce sont ces acteurs clés, qui utilisent les terres impactées pour leurs activités économiques.

Leur perception, craintes et suggestion se présentent donc comme suit :

### 2.3.1. Perceptions

- L'expérience du projet de l'aéroport a fait perdre toutes les illusions aux populations en générale et au présent cible. En effet, cette catégorie d'acteurs ne croient plus dans les avantages d'un quelconque projet initié par l'état pour la localité. « Nous avons déjà perdu beaucoup de terre à TANGBO DJEVIE dans le cadre de la délimitation de la zone de l'aéroport et sans un dédommagement conséquent. Beaucoup de promesses nous ont été faites sans suite » ;
- Avec cet autre projet qui va encore induire l'expropriation des populations de leurs terres cultivables. Suscite beaucoup d'amer interpellation de leur part ; « Où allons-nous aller ? Qu'allons-nous faire ? » Vraiment pourquoi faut-il que tous les projets de l'Etat soient concentrés à Tangbo ? veut-il en finir avec nous ? ne sommes-nous donc plus des béninois aussi ? comment allons-nous pouvoir vivre sans nos activités de subsistances ? l'Etat n'a qu'à avoir pitié de nous. On est fatigué. On ne veut pas de ce projet». Un rejet systématique est fait de l'idée même d'un nouveau projet dans la localité. « Même si on nous donne des milliards, nous préférons garder nos champs qui, hier avaient nourris nos ancêtres, nous nourris aujourd'hui et nourriront nos enfants demain ;



- Est alors convié par ces acteurs à être pour une fois à l'écoute de sa population et à faire preuve de clémence envers elle. « Que l'Etat nous écoute, aie pitié de nous et nous laisse le peu de terre qui nous reste ».

### 2.3.2. Craintes

La principale appréhension réside dans les maux que ce projet va engendrer pour les populations, à savoir :

La famine, le vol, la recrudescence de la criminalité, la dislocation de notre organisation sociale, les conflits internes entre les familles comme dans le cadre du projet de l'aéroport, la perte des valeurs culturelles, les maladies dû à la pollution atmosphérique, sonore et autre du fait du projet, la prostitution probable des femmes, les divorces

### 2.3.3. Suggestions

Les suggestions de cette catégorie d'acteurs, demeurent invariables par rapport à celles des acteurs précédemment rencontrés. Et sont formulées de la façon suivante :

Que l'Etat trouvent d'autres sites loin de Tangbo- Djèvié, pour abriter ce projet. Cependant que se référant à la réalité ces acteurs ajoutent « Mais comme nous, on n'a pas de volonté, s'il arrivait que l'Etat ne nous écoute pas alors,

- il faut penser à : dédommager toutes les personnes affectées par le projet à la juste valeur de leur terre avant tout démarrage des travaux ;
- Permettre aux exploitants de pouvoir récolter leur culture en cours ;
- Prioriser la main d'œuvre locale et recruter en premier lieu les fils du village qui ont des diplômes et compétences requises ;
- Construire des infrastructures dans les villages impactés tels que l'accès à l'eau, à l'électrification, aux centres de santé, aux centres de loisirs et de sports etc.



Figure 3/ Représentants, exploitants, éleveurs, propriétaires terriens

## 2.4. Entretien avec les organisations de la société civile

Les organisations de la Société Civiles de la localité, sont pour la plupart constituées de façon informelle ce qui revient à dire qu'elles ne sont pas toutes légalement enregistrées. Cependant il y en a qui sont



régulièrement enregistrées avec une existence tout à fait légale. Les perceptions, craintes et suggestions de ces acteurs concernant le projet ARISE INDUSTRIAL ZONE sont les suivantes :

#### 2.4.1. Perceptions

- Ce projet peut développer notre milieu certes mais nous n'en voulons pas ;
- Nous avons déjà été déposséder de plusieurs de nos terres au détriment du projet de l'aéroport de Glo. Si ce projet vient pour nous exproprier encore nous n'en voulons pas. Nous préférons garder nos terres ;
- Si le promoteur veut réellement un espace pour son projet, qu'il aille prendre dans le domaine de l'aéroport que nous avons cédé il y a peu.

#### 2.4.2. Craintes

- Notre milieu va se transformer en pôle de délinquance ;
- il y aura la famine qui poussera la population au vol, la prostitution, les maladies, le déshonneur, la mort.

#### 2.4.3. Suggestions

Le PDC communal, la Mairie de Zè a prévu l'implantation de sa zone industrielle dans la localité de ADJAN. Si que cette prévision de la Mairie puisse faire objet d'examen afin que le site du projet soit déplacé là-bas.



Figure 4 : Représentants OSC Zè

### 2.5. Entretien avec les jeunes

Les jeunes de TANGBO DJEVIE s'organisent en association de jeunes pour s'entraider et pour le développement de l'agriculture et de la culture d'ananas en particulier, en association de jeunes footballeurs pour leur et en association pour l'assainissement et le développement de l'arrondissement. Ces associations n'ont pas de domaine sur le site du projet ARISE INDUSTRIAL GROUP. La plupart les membres possèdent des terres ou ont loués des terres dans le domaine du site. Ils n'ont pas de siège mais font leurs réunions au niveau des places publiques ou chez un membre du bureau. Ils sont tous riverains au site du projet ARISE.

### 2.5.1. Perceptions

Les jeunes des villages concernés par le projet ont pour la plupart conscience que ce projet pourrait contribuer au développement de leurs villages respectifs. C'est le sort des agriculteurs qui se trouvent être leur plus grande préoccupation.

En effet la grande majorité des jeunes ont pour activités génératrices de revenus, l'agriculture. Ces derniers ont pour la plupart acquis des terres par héritage, achats ou locations pour mener leurs activités. Donc disent que c'est l'activité de base de cette zone. C'est un héritage pour eux l'agriculture. Puisque la grande majorité n'est pas instruite, chaque acteur dit avoir hérité sa terre de son père qui lui aussi l'a hérité de son père ainsi de suite. Face à la nouvelle de la venue du projet, leurs réactions ont été pratiquement le même. Ils ne veulent pas d'un projet qui viendrait une fois de plus leur arracher leurs terres, leur principale source de "gagne-pain". Pour eux ils sortent à peine des "calvaires" du projet de l'aéroport de Glo "où l'Etat leur a pris plusieurs hectares de terres et n'a pas selon eux dédommager les propriétaires de ces terres à sa juste valeur. L'idée d'un autre projet qui va encore leur prendre le peu de terre cultivable qui leur reste ne les séduit pas du tout. Ces jeunes pensent que l'Etat peut faire preuve de compréhension et de compassion à leurs égards et chercher l'espace qui lui faut pour ce projet ailleurs. A ADJAN toujours dans la commune de ZE

### 2.5.2. Craintes

Les jeunes de TANGBO DJEVIE ont exprimé leur crainte par rapport au projet. On peut citer :

- La non prise en considération des préoccupations de la population ;
- Le non-recrutement des agriculteurs qui sont à 90% analphabètes pour intervenir dans les travaux de main d'œuvre sur le site ;
- La faim et la famine dû à la non-disponibilité de terres cultivables ;
- L'exode rural des jeunes ;
- Le non-dédommagement des terres à leur juste valeur ;
- La déscolarisation dû au manque de moyen des parents à pouvoir inscrire leurs enfants ;
- La prostitution des jeunes filles et des femmes dû à la faim ainsi que les divorces ;
- La mort par souci ;
- L'insécurité et le vol dû à l'oisiveté.

### 2.5.3. Suggestions

Les jeunes de TANGBO DJEVIE pensent que si l'Etat peut trouver un autre emplacement pour ce projet, ce serait mieux pour tous. Selon eux, Il y aurait une zone industrielle prévu dans le PDC de ZE et c'est à ADJAN.

Et « si malgré notre résistance de ne pas vouloir de ce projet, l'Etat devrait nous prendre nos terres alors il faut penser à :

- Dédommager les personnes affectées à la juste valeur de leurs terres, biens et équipements ;
- Recruter la main d'œuvre locale et prendre en compte les fils du village qui ont des diplômes ;
- Penser à la construction d'infrastructures dans les villages impactés tels que l'accès à l'eau, à l'électrification, aux centres de santé, aux voies et pistes routiers, aux marchés etc. ;

- Démarrer les travaux après tout dédommagement et ne pas laisser les terres “en jachères” comme c’est le cas dans le cadre du domaine de l’aéroport. ».



Figure 5 : Focus des jeunes de Houézè et de Anavié dans Zè

## 2.6. Entretien avec les femmes

L’entretien avec les femmes de l’arrondissement de Tangbo Djèvié révèle que ces dernières ont un niveau d’étude scolaire faible (primaire pour quelques-unes, nul pour la plupart), néanmoins, elles ont toutes des compétences professionnelles qui leur permettent de s’adonner à des activités économiques. Elles sont, soient des coiffeuses, couturières, commerçantes et / ou des exploitantes agricoles.

Ces actrices, s’organisent en groupe ou association d’entraide et de solidarité, qui se soutiennent économiquement. Elles participent au processus de prise de décision aussi bien dans leur foyer que dans leur localité. Mais bien qu’étant propriétaire terrien par acquisition, leur accès à la terre par héritage demeure encore défi dans une société où pendant longtemps seuls les hommes avaient droit à l’héritage.

Les perceptions, craintes et suggestions de ce groupe spécifique s’articulent comme suit :

### 2.6.1. Perceptions

- « C’est un bon projet, mais nous n’en voulons pas dans notre village » ;

- « L'Etat n'a qu'à nous laisser tranquille. On est fatigué qu'il nous arrache nos terres. Les terres sont nos seules richesses » ;
- « Dans notre localité, nous ne sommes pas lettrées et c'est grâce à l'agriculture et des produits issus de l'agriculture que nous arrivons à nourrir nos familles et à s'occuper de nos enfants » ;
- « Ce projet va amener la famine dans notre village » ;
- C'est l'agriculture qui est l'activité principale du village. Qu'allons-nous devenir si nous perdons le peu de terres qui nous reste en plus des terres déjà perdues dans le domaine de l'aéroport ? ».

### 2.6.2. Craintes

La principale crainte des femmes de l'arrondissement est selon elles que les terrains de leurs hommes (mari, frères, pères...), soient arrachés comme dans le cadre de l'aéroport.

### 2.6.3. Suggestions

Que le promoteur du projet aille prendre l'espace nécessaire dans le domaine de l'aéroport qui est très grande ou aille ailleurs pour mettre en exécution son proje



Figure 6 : Focus avec les femmes de Zè

## 2.7. Entretien avec les personnes vulnérables

### 2.7.1. Perceptions

Les personnes vulnérables reconnaissent tous que c'est un bon projet mais tout comme les acteurs précédents pensent que c'est un projet qui va les ruiner et les détruire quand ils évoquent le volet expropriation que le projet va induire et les dégâts de cette expropriation sur la population de leur localité.

### 2.7.2. Craintes

Comme craintes on peut noter :

- La mort de certains par soucis ;
- La faim et la famine dû à la non-exécution des travaux champêtres qui aident beaucoup la population à nourrir sa famille ;



- Les vols et la délinquance dû à la fin.

### 2.7.3. Suggestions

Les suggestions formulées par ces acteurs rejoignent celles que les acteurs précédents ont déjà formulées et se résument à ce que l'Etat qui est le promoteur du projet ARISE INDUSTRIAL ZONE, déplace sa zone de projet ailleurs que dans leur commune.



Figure 7 : Focus avec les personnes vulnérables de Zè

## **Annex XIII Reports minutes and attendance lists of the public consultation meetings conducted in the boroughs of Tori-Cada and Tangbo-Djéviè – ESIA disclosure consultations**



Procès Verbal de Consultation publique de restitution des <sup>(1)</sup>  
résultats de l'EIES internationale du projet de Zone  
Industrielle de Glo-Ijigbé porté par ARISE Bénin et la  
République du Bénin (Mairie de Tori-Bossito)

L'an deuxmil vingt et le cinq novembre, s'est tenue à la  
mairie de Tori-Bossito la séance de consultation publique  
et des résultats de l'EIES du projet cité ci haut.

Etaient présents à la séance l'autorité communale,  
ses adjoints et les CA de Azohoué-Aliho, Tori-Bossito, Tori-  
(Voir liste de présence) Cada et les cadres de la mairie  
L'ordre du jour de la séance est le suivant :

- 1 - Présentation des participants
- 2 - Mot d'ouverture du Maire
- 3 - Présentation des mesures COVID-19
- 4 - Présentation du Power-Point du résumé non-technique
- 5 - Questions

Après la présentation des participants et le mot  
d'ouverture de l'autorité communale, la responsable  
du volet social a présenté les résultats de l'EIES aux  
participants. Dans la présentation les impacts positifs  
du projet aussi bien sur le plan humain, naturel et  
environnemental ainsi que des mesures d'atténuation ont été exposés.  
Après la présentation, les participants ont posés les  
questions d'éclaircissement et fait des commentaires et  
suggestions.



Maire a suggéré et demandé que le projet ②  
prenne en compte toutes les deux communes couvertes par le  
Zé et Tori et non l'une avant l'autre. Il a demandé  
que tout le lobbying et le plaidoyer nécessaire soit fait  
pour que le projet dans sa première phase puisse impacter  
aussi bien Tori-Bossito que Zé. Et que pendant toutes les  
phases du projet, l'implantation des infrastructures soit  
équilibrée.

A la suite du Maire, le premier adjoint a voulu des  
éclaircissements sur les relations qui lient le projet de  
Zone industrielle de Glo-Djigbé, la zone économique  
spéciale (ZES) et la zone à aménagement différencié  
(ZAD).

Le maire a rebondi en demandant des mesures de  
bonification prévues pour juguler les impacts négatifs  
que vont induire le projet. Il suggère que le projet  
dans ces mesures, participe activement au développement  
de l'arrondissement de Tori-Lada impacté par le projet  
sur tous les plans.

Le SG en guise de plaidoyer a suggéré que le promoteur  
puisse dans son plan de développement communautaire  
accompagner la promotion des forêts sacrées de Tori dans  
le but de booster l'écotourisme au sein de la commune.  
Le deuxième adjoint au Maire quant à lui voulait  
savoir les critères sur lesquels on s'est basé pour  
délimiter la zone de la première phase du projet et Tori.



essito n'est pas touché.

Ses réponses données aux différentes préoccupations se résument comme suit :

Les questions posées sont très pertinentes. Cependant, dans la conception du plan de la zone industrielle, l'implantation des infrastructures n'a pas tenu compte de la position des communes mais plutôt de la carte de la zone. Néanmoins des doléances et recommandations de la séance seront portées à la connaissance du promoteur.

Au nombre des mesures de bonification prévues dans l'EIES, figure le plan de développement communautaire. Ce plan est un gros volet qui peut inclure les actions de développement de secteur à promouvoir dans la commune et l'arrondissement impacté.

La ZAI est incluse dans la zone industrielle de Glo-Jigbé et ce dernier n'est qu'une partie de la ZES.

Il convient de retenir que le promoteur n'est pas dans une dynamique de développement d'une commune au détriment de l'autre mais plutôt dans une démarche globale, inclusive qui priorise la communication avec toutes les parties prenantes des communes impactées par le projet GOI Z.

La séance démarrée à 10h40min a pris fin à ⑭  
12h04 min après l'expression de la satisfaction de l'assis-  
tance et les mots de fin de l'autorité communale qui  
a promis suivre personnellement le dossier.

Ont signé

Le Maire

AKOUAKOU Rogère

Le PAM

AKONDE Come Ayao

Le DAM

LANTEFAN Romain

Le SG

Müller O. HOUNTONDSI



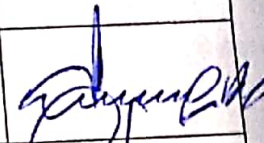
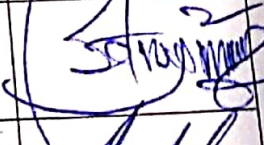
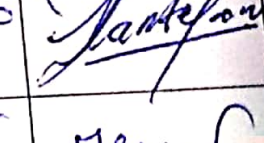
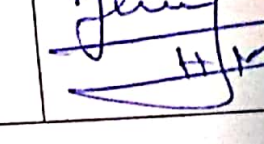


Date, le 05/11/2020

Commune de : Toai-Bossito  
Arrondissement de : Toai-Bossito  
Village de :

**Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

Liste de présence

N°	NOM et PRENOMS	H/F	Structure	Qualification	Adresse/ téléphone	Emargement
01	AKOWAKOU Rogatien	H	Mairie Toai-Bossito	Maire	97444354	
02	AKONDE Ayao Cosme	H	Premier Adjoint au Maire Toai-Bossito	PAM	97722188	
03	LANTEFAN Romain	H	Mairie Toai-Bossito	DAM	97987756	
04	HOUNTON DSI Müller Arcan	H	Mairie Toai-Bossito	SG	979915 01	



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N°	NOM et PRENOMS	H/ F	Qualification		Adresse/ téléphone	Emargement
05	AGBOZO Gérard	H	CA Azohoué-Aléto	Mairie de Tori-Bossito	96957698	
06	AZONNASSOU Célestin	H	C/SAJE	Mairie de T-Bomito	51504561	
07	ACCOMBESSI Constant	H	CA Tori-Bossito	Mairie de Tori-Bossito	97931531	
08	FADEKON Alain	H	CA TORI- CADA	Mairie de Tori-Bossito	97315852	
09	KPODJEOD Sylvie	F	Resp. Volet social	ANTEA	96995300	
10	TOSSAH Isaac	H	Assistant Resp. Volet social	ANTEA	96062006	
11	MONTANGOU Herbert	H	Resp. Commercial	SIRI	61450004	



11/11/2020

# Procès verbal de la consultation Publique de restitution des résultats de l'EIES internationale de la zone Industrielle de Glo-Djigbé à Dokanné

L'an 2020 et le mercredi 11 novembre  
s'est tenue dans le village de Dokanné de l'arrondis-  
sement de Tori-Cada, Commune de Tori-Bossito,  
une séance de restitution de l'EIES internationale de la  
Zone Industrielle de Glo-Djigbé. ~~Commune de~~  
Prévoir pour commencer à 13h la séance a effective-  
ment commencé à 14h20 et a pour ordre du jour

- 1 - La Présentation des participants
- 2 - Le mot d'ouverture du chef village
- 3 - La sensibilisation sur les mesures  
COVID 19
- 4 - La présentation des résultats de l'EIES  
internationale de Glo-Djigbé
- 5 - La collecte des questions des participants  
suivie des réponses.
- 6 - La clôture de la séance.

Après le déroulement des 6 premiers points  
de l'ordre du jour, il y a eu la collecte  
des questions des participants qui se structure  
comme suit :

1 - Vous avez dit que les travaux se dérouleront en 3 phases. Quelle est la délimitation par phase du travail?

2 - Nous aimerions qu'on nous explique comment se fera le dédommagement?

3 - Quel sera le sort réservé aux riverains non lésés sans le recensement? Vous avez parlé de priorisation de la main d'œuvre locale cependant nous souhaiterions savoir si les non lésés auront une chance d'être recrutés?

4 - Nous ne souhaiterions pas que les travaux se passent dans la Zone Industrielle comme ce qui s'est passé dans la zone de l'aéroport! Par ailleurs n'allez pas recruter des personnes ~~étrangères~~ à la place des véritables habitants. Pour finir nous voulons savoir comment le dédommagement va se passer.

5 - c'est une bonne chose que vous nous ayez fait une restitution image, mais s'il vous plaît ne vous flouez pas! Si vous nous arrachez les terres et que vous ne nous trouvez pas quoi faire, ce ne sera pas bien. Pensez et recrutez effectivement la main d'œuvre locale.



⑥ - Les terres nous ont été déjà arracher mais nous n'avons pas encore entendu parler de dédommagement. A quand le dédommagement? et comment va t'il se passé?

⑦ sur le plan, moubé où se trouve Dokanne?

⑧ Le domaine arraché sous l'aéroport les exigences de l'Etat par rapport au papier avant le dédommagement fait que beaucoup ont abandonné ne sont pas aller au bout. Les géomètres aussi nous gâchent beaucoup dans ces travaux. Nous espérons que la même chose ne va pas se passer pour la zone Industrielle!

Par ailleurs ~~vous~~ nous avez parlé de priorité de la main d'œuvre locale. Dites nous si où les travaux ont commencé combien de villageois ont été déjà recrutés?

Les réponses apportées à ces questions se ressemblent de la façon qui précède :

- Il est important d'avoir les papiers de propriété de ses parcelles quand on est sur d'être le propriétaire. Même les héritiers peuvent se faire établir les papiers auprès d'un

autorités.

(1)

sous les papiers il est difficile de départager le faux propriétaire du vrai propriétaire.

Il serait intéressant que vous vous arrangez pour avoir vos papiers sous la main avant que le processus de dédommagement ne commence.

- Les travaux n'ont pas encore commencé donc on ne peut encore parler de recrutement de main d'œuvre du tout.

- Le cabinet INSUCO se chargera de vous donner en son temps des précisions sur le dédommagement.

- Le recrutement de la main d'œuvre locale est un principe de loi qui s'impose au promoteur et en son temps vous aurez à son niveau des précisions sur les critères à remplir pour être recruté.

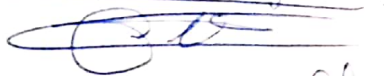
Mais comprenons que ce qui s'est passé dans la zone de l'aéroport et précisément la façon dont les expropriations se sont déroulées continue de vous traumatiser et de vous rendre dubitatif par rapport au projet de la Zone Industrielle. Mais comprenez que ce sont deux projets différents.



et que le...  
A prêt pour...  
laissera...  
Nous nous...  
restituer...  
vous vous...  
votre...  
communication...  
pour votre plus grand intérêt.


La séance a pris fin à 16h35 avec  
mots de remerciement des participants.

Ont signé



ODEU Nargellin

KOKODSOKOU André

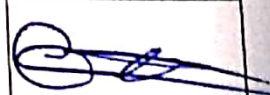
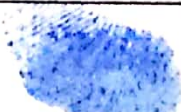


  
DANGBENON Grahien

Date, le 12/11/20

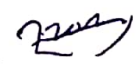
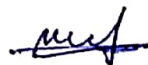

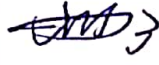
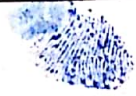
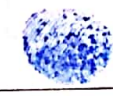
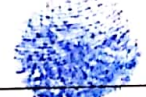


Commune de : TORI-BOSSITO  
Arrondissement de : TORI-Cada  
Village de : Dokanmè

**Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

Liste de présence

N°	NOM et PRENOMS	H/F	Structure	Qualification	Adresse/ téléphone	Emargement
01	ODOU Marcellin	H	Village	CV Dokanmè	66286751	
02	GANGBENDI David	H	"	Cultivateur	—	
03	ADOLU Abel	H	"	Soudeur	66040587	
04	DISSOU Pacôme	H	"	Chauffeur	97537551	



N°	NOM et PRENOMS	H/ F	Qualification		Adresse/ téléphone	Emargement
05	KOKODJEROU Sylvain	H	Gardienn Tradi	Village	9723474	
06	DISSOU Anatole	H	Chauffeur	"	66480196	
07	KODO Barnabé	H	"	"	97375733	
08	APIEH Augustin	H	Cultivateur	"	91781625	
09	HODMONI Denise	F	Revenduse	"	-	
10	KINDJINDU Akemongondé	F	Cultivatrice	"	-	
11	ARONDE Marcellin	H	"	"	97623875	
12	ODOU Avoce	H	"	"	81578292	
13	KOKODJEROU Guillaume	H	"	"	-	



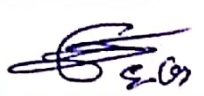

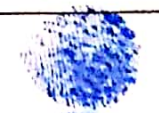
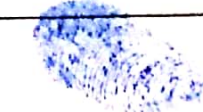



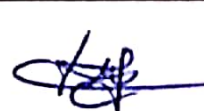
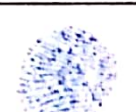
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N°	NOM et PRENOMS	H/F	Qualification	structure	Adresse/ téléphone	Emargement
14	BIO Sonia	F	Revendeuse	Village	6261124	
15	AKYE Christophe	H	Cultivateur	"	66940372	
16	YEHOUENOU Pélagie	F	Couturière	"	-	
17	ODDOH Clément	H	Cultivateur	"	68139732	
18	HINDEME Sylvain	H	Enseignant	"	61498540	
19	YESSINDO Sédaminou	F	Revendeuse	"	-	
20	KORDO Nestor	H	Magasin	"	-	
21	AIRONDE Julien	H	Mécanicien	"	95260745	
22	JOISSOU Cyrille	H	Cultivateur	"	97037931	

N°	NOM et PRENOMS	H/F	Qualification	structure	Adresse/ téléphone	Emargement
23	DISSOU Gaspin	H	Cultivateur	Village	66286039	
24	ODJOU AHLOU Victor	H	Soudeur	"	97622454	<del>Soudeur</del>
25	DISSOU Jules	H	Cultivateur	"	97458570	<del>Soudeur</del>
26	DANGBENDON Gratien	H	Gardienn Traditionnel	"	97171530	<del>IV</del>
27	AKOUGNE Béni	H	Cultivateur	"	6103046	<del>Soudeur</del>
28	TOGBE Vicentia	F	Revendeuse	"	60242863	<del>IV</del>
29	DOUDU Bernadette	F	Revendeuse	"	67441754	<del>Soudeur</del>
30	DISSOU Jonas	H	Cultivateur	"	61116804	<del>Soudeur</del>



N°	NOM et PRENOMS	H/ F	Qualification	Structure	Adresse/ téléphone	Emargement
31	ODOUN Jeremie	H	Cultivateur	Village	—	
32	ODOUN Francois	H	"	"	—	
33	DANGBENDON Dieudonné	H	"	"	97632056	
34	HOUNKARRIN Amour	H	Etudiant	"	67239766	
35	DANGBENDON Jonas	H	Cultivateur	"	97790877	
36	KDOUJALE Jérémie	F	Ménagère	"	61880387	
37	GNANGBENDON Félicienne	F	Cultivatrice	"	—	
38	KDOUJALOM Brigitte	F	Coiffeuse	"	—	
39	DJISSOB Samuel	H	Cultivateur	"	—	

N°	NOM et PRENOMS	H/F	Qualification	Structure	Adresse/ téléphone	Emargement
40	SESSIMO Georges	H	Elève	Village.	51 11 03 32	
41	AKONDE Dés-Gratias	H	Elève	Village	51 52 52 75	
42	AKONDE Marius	H	Coufleur	Village	-	
43	SOGBOSSI Félicienne	F	Cultivatrice	Village	-	
44	DJISSOU Noudagba	H	Cultivateur	Village	-	
45	BENJAMIN SEDJRO	H	"	"	-	
46	HADONOU HUGO	H	Chauffeur	Village	97085737	
47	DANGBENON Mathias	H	Cultivateur	"	96424948	
48	HOUNYEGBO David	H	"	"	98171182	

anteagroup

Qualification

structure

Adresse/  
téléphone

Emargement

N°

NOM et PRENOMS

H/F

49 KOKODJEROU  
André

H

Producteur  
d'ananas

Village

66367184

*[Signature]*

50 ODOUN  
Bernard

H

Chauffeur

11

96662431

*[Blue Stamp]*



13/11/2020

# Procès Verbal de la consultation Publique de restitution des résultats de l'EIES de la Zone Industrielle de Glo-Djigbe à Gbetaga

L'an 2020 et le mardi 10 novembre s'est tenue  
une séance de consultation Publique de restitution  
des résultats de l'EIES Internationale de la Zone  
Industrielle de Glo-Djigbe.

La séance qui a finalement commencé à 16h30  
a pour ordre du jour:

- 1 - La Présentation des participants
- 2 - Le mot d'ouverture du chef village
- 3 - La Présentation et sensibilisation sur les  
mesures COVID19
- 4 - La Présentation des résultats de l'EIES  
Internationale de la Zone Industrielle de Glo-  
Djigbe
- 5 - La collecte des questions des participants  
suivie des réponses
- 6 - La clôture de la séance.

La présentation des résultats de l'EIES inter-  
national a fait suite aux trois points précédents  
de l'ordre du jour à savoir: la Présentation des  
participants, le mot d'ouverture du chef village,  
la sensibilisation sur les mesures COVID19.

Les questions et préoccupations des participants se  
structurent comme suit:

(2)  
1 - Comment exproprie t'on les propriétaires fonciers?  
Quelles sont les stratégies mise en place

2 - Dans votre interventions vous avez mis l'accent  
sur les mesures à prendre pour nous exproprier  
afin de nous permettre de continuer à vivre dans  
montrés de laim, nous espérons que vous nous  
dites la vérité et que ce n'est pas un leurre, si  
le promoteur peut vraiment prendre des mesures ce sera  
bien pour nous.

3 - L'Etat est certes chef de la terre, nous le savons  
mais que va t'il se passe? nous exproprie t'on  
pour ce bon ou nous pouvons revenir sur nos  
terres au bout d'un certain temps?

4 - Nous savons que nous ne sommes pas au dessus  
de la loi cependant, ~~vous~~ ne pouvons quitter là  
où nous avons toujours vécu et pratiquer nos  
activités comme des locataires d'un jour à l'autre  
Nous vous avons demandé de planter pour notre  
dédommagement, qu'en est-il?

5 - Nous n'aimons pas que vos réponses soient  
des paroles mielleuses des parties politiques à la  
veille des élections. Nous aimerions que l'Etat débarrasse  
avant le début des travaux

6 - Nous voyons que la superficie du projet est immense,  
nous aimerions savoir si aussi bien les champs que les  
maisons sont impactés?



7- Comme les travaux n'ont pas encore commencé <sup>(3)</sup> ici et que tout se passe actuellement à Zé et vue mes besoins actuels, puis-je vendre mes terres pour résoudre mes problèmes?

8- Concernant la priorisation de la main d'œuvre locale, va-t-on recruter les non diplômés, les illettrés? Car il y a beaucoup d'illettrés dans nos villages?

9- Si nous ne pouvons pas vendre nos biens expropriés avant dédommagement et dans le besoin donnez nous une adresse où nous pourrions protéger nos besoins quand nous sommes dans l'urgence.

10- Existe-t-il une délimitation de la Zone du projet?

Les réponses à ces questions se résument de la façon suivante:

- Nous ne détenons pas les informations nécessaires et pertinentes pour pouvoir vous informer <sup>ni</sup> sur les stratégies d'expropriations mise en œuvre qui seront mise en place, ni sur le montant des dédommagement à ce niveau, nous pourrions juste vous dire qu'en son temps, le Cabinet INSUCO, qui travaille en ce moment sur le Plan d'Action de Réinstallation et de compensation (PARC), vous apportera l'information appropriée.

- Les impacts positifs et les mesures d'atténuation et de bonification présentées, figurent dans le Plan de Gestion- Environnemental et Social (PGES)

Et son observance s'impose au promoteur qui est lui-même dévot de les respecter. ce ne sont donc pas des tromperies. nous c'est la loi qui l'impose.

- Vous ne pourriez plus revenir sur les terres, ~~quant~~ les travaux vont commencer. Ce que nous essayons de vous expliquer c'est les phases et les durées mieux ce sont les étapes de déroulement des travaux et même que la durée de chacune d'elles et les limites qu'elle couvre. A la fin de ces trois phases, vous aurez sur le site des infrastructures que nous vous avons montrées en image. Vous comprendrez alors qu'il n'y aura plus de place pour le champs.

- Les espaces impartés sont surtout les champs, cependant, il y a ~~quelques~~ maisons qui le sont aussi, les maisons isolées et les hameaux.

- A partir du moment où l'Etat a fait la déclaration d'Utilité Publique sur le périmètre vous ne pouvez plus vendre vos terres qui y figurent mais vous avez à attendre que la procédure ait son cours jusqu'à votre dédommagement.



- le Promoteur en son temps vous informera sur la qualification de la main d'œuvre tout ~~à~~ il a besoin.

- la délimitation précise de la zone du projet sera se fera suivant les phases du projet

D'une façon générale notre mission à nous consiste à vous restituer les résultats de l'EIES, pour que vous vous l'appropriiez, le travail continue et se précisera avec INSUCO. Ouvrez-vous à la collaboration et tout ira pour le mieux.

La séance a pris fin à 18h30 après les remerciements de l'un et de l'autre.

Ont signé

AVOUE ETIEN

Seraphin

Kiki



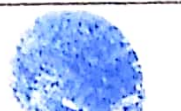

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Date, le 10/11/2020

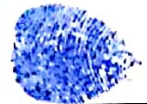
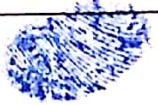
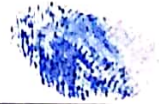




Commune de : Tori - Bassito  
Arrondissement de : Tori - Cada  
Village de : Gbèta-aga

**Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

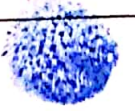
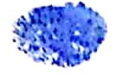
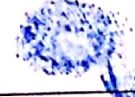





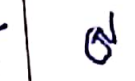
Liste de présence

N°	NOM et PRENOMS	H/F	Structure	Qualification	Adresse/ téléphone	Emargement
01	AVOCETIEN Serafior	H	Village	CV Gbèta-Aga	97458553	
02	TANTINDON Jacques	H	"	Volontaire	91640263	
03	KOUTON Florentin	H	"	Cultivateur	97380682	
04	TDGBE Germano	H	"	Brigadier	68217359	



N°	NOM et PRENOMS	H/ F	Qualification		Adresse/ téléphone	Emargement
05	HEMAHO Victor	H	Cultivateur	Village	91322541	
06	GBENANANON Nicolas	H	"	"	97861329	\$
07	LALI Paul	H	Cultivateur	"	-	
08	KDOTON Simon	H	Chauffeur	"	-	
09	KINTOHOU Loïc	H	Cultivateur	"	-	
10	AGBIN Mathieu	H	"	C1	-	
11	KIKI Claude	H	"	"	-	
12	KDOTON Abel	H	"	"	61331092	

N°	NOM et PRENOMS	H/F	Qualification	Stru dore	Adresse/ téléphone	Emargement
13	GAGA Léon	HA	Cultivateur	Village	—	2
14	TORGRE Tondé	H	Cultivateur	11	62065960	
15	ANATO Madeline	F	Revenduse	11	62577069	
16	DOSSANI Rose	F	Cultivatrice	11	61279316	
17	TOT Philomène	F	11	11	—	
18	AMADJI Sinhou	F	11	11	—	
19	TOMIN Thérèse	F	Revenduse	11	—	
20	MINTOU WANDU Albertine	F	11	11	—	

N°	NOM et PRENOMS	H/ F	Qualification		Adresse/ téléphone	Emargement
21	BAT Bénédict	H	Contorère	Village	-	
22	AZONBAKIN Eugénie	F	Cultivatrice	"	-	
23	AGBIN Bernadette	F	"	"	-	
24	SOUNDOHO Jeanette	F	"	"	-	
25	ZANNO Anagoron	F	"	"	-	
26	BONDY Agbale	F	Revdase	"	-	
27	HOONKPEVI Yvette	F	"	"	-	
28	GBENANGNON Seyika	F	Cultivatrice	"	-	
29	DSD DSD Germain	H	"	"	97 853525	

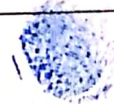

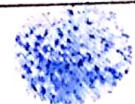
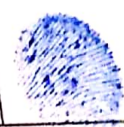


Date, le 10/11/20

Commune de :  
Arrondissement de :  
Village de : Gbèta-Aga

Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin

Liste de présence

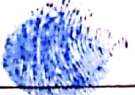

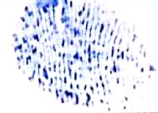

N°	NOM et PRENOMS	H/F	Structure	Qualification	Adresse/ téléphone	Emargement
30	NODDUNKPE Augustin	H	Village	Cultivateur	66990218	
31	HODVEDAN Christine	F	"	"	-	
32	HODNOUWIN Odile	F	"	"	61031037	
33	GBOWI Clarisse	F	"	"	51448719	

Date, le 10/11/20

Commune de :  
Arrondissement de :  
Village de : Gbèta - Aga

**Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

Liste de présence

N°	NOM et PRENOMS	H/F	Structure	Qualification	Adresse/ téléphone	Emargement
34	KOUDENDY KPO Zinhoné	F	Village	Revendeuse	91640788	
35	KIKI Martin	H	II	Cultivateur	—	
6	DJISSOU Felix	H	II	Peintre Batiment	66642635	
1	ABITI Adjouké	F	II	Revendeuse	—	



Date, le

Commune de :  
Arrondissement de :  
Village de : Gbèta - Aga

Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin

Liste de présence

N°	NOM et PRENOMS	H/F	Structure	Qualification	Adresse/ téléphone	Emargement
38	HODKPEWU Yvette	F	Village	Revendeuse	97052800	
39	DJEGBENDU Norjo	F	"	Cultivatrice	-	
40	TCHAHOU RA Delphine	F	"	"	-	
41	SAYI Rosette	F	"	"	61613428	

# Procès Verbal de Consultation Publique

10/11/2020

de restitution des résultats de l'Etude  
d'Impact Environnemental et Social (EIES)  
Internationale de la Zone Industrielle de  
Glo-Djigbé dans le village de Sogbé dans  
l'arrondissement de Toki-Cada, commune de  
Tori-Bossito

L'an 2020 et le mardi 10 novembre 2020  
tenus dans le village de Sogbé, une séance  
de consultation publique de restitution  
des résultats de l'EIES internationale de  
la zone industrielle de Glo-Djigbé.  
prévue pour 13h, la séance a effectivement  
commencé à 14h 29 mn et avait pour  
ordre du jour :

- 1 - La présentation de l'équipe et l'énoncé  
de l'objet du jour
- 2 - Le mot d'ouverture du chef village (CV)
- 3 - La sensibilisation sur le covid 19
- 4 - La Présentation des résultats de l'EIES
- 5 - La Foire aux questions et Préoccupations
- 6 - Réponses aux questions
- 7 - clôture de la séance.



La séance a commencé par la présentation<sup>12</sup> des participants suivie de l'énoncé de l'objet du jour.

Le chef village est invité ensuite à ouvrir la séance.

Une brève sensibilisation sur les mesures barrière de COVID-19 a été faite à la population qui a été invitée ensuite au lavage des mains et des caches-nez leur ont été distribués ensuite.

Les résultats de l'EIES internationale de la Zone Industrielle de G10-Djigbé ont été présentés aux participants puis ils ont été invités à exprimer toutes leurs préoccupations restantes mais aussi à poser toutes les questions auxquelles ils n'ont pas encore de réponses par rapport au projet.

Les préoccupations et questions recueillies auprès des participants se structurent comme suit :

1 - Ce projet est un véritable sabotage de notre vie quotidienne et de notre avenir.

Nous sommes des agriculteurs et nos champs nous permettent de régler vraiment tous nos problèmes de subsistance en passant par la santé, l'éducation de nos enfants jusqu'à nos contributions à la vie



de nos familles, de notre communauté.  
grâce à nos champs nous nous arrangeons

à n'avoir aucune dette. Et puis d'un jour à l'aube, vous débarquez comme ça et nous parlez de projet de zone industrielle qui vient nous déposséder une fois de plus de nos terres! Sachez qu'il y a un Dieu! Quand nous avions été expulsé de nos terres dans la zone de l'aéroport sans un véritable dédommagement, vous nous avez dit que nous pouvions nous réfugier ici. Si vous nous chassez de nouveau d'ici, où irons nous? Dieu qui est vivant vous regarde!

1<sup>er</sup> plus vous vous avez le privilège d'avoir un salaire mensuel mais vous voulez que nous nous mourons de faim. Dieu est très juste!

2 - Aujourd'hui vous êtes là à nous parler de priorité à la main d'œuvre locale. Nous savons bien comment ça se passe. Demain, il n'est pas évident que vous fassiez même semblant de nous reconnaître. Ce seront vos connaissances et parents qui seront les premiers à être recrutés.

3 - De plus à la radio, nous entendons et comprenons que l'état a déjà fixé les coûts des terres dans la zone déclarée "Economique".

(11)  
là. Quand nous avons des problèmes, nous avons toujours la possibilité d'aller dans nos champs, récolter tels vivres ou tels autres, les vendre et résoudre nos problèmes très vite. Comprenez que votre projet ne peut nous aider en rien dans l'amélioration de notre vie.

8- Si l'Etat veut vraiment nous aider, qu'il nous trouve d'autres terres où nous pourrions continuer à vaquer dans à nos activités, champêtres. Sans chercher à nous parler d'un dédommagement qui ne nous profitera pas en rien. Car nous reconnaissons que ce serait difficile car il serait ne trouver dans la Zone, des terres non occupées et à vendre.

9- Nous les femmes de Sogbé, nous reconnaissons la valeur des terres et du travail agricole de nos maris. C'est avec ça qu'ils parviennent à subvenir aux besoins de la famille avec notre accompagnement. Si vous leur arrachez les terres que deviendrons nous? Ça sera la fin des familles?



Formation auront besoin nos enfants pour  
pouvoir y travailler et nous allons les y mettre.  
7 - Il est vrai que on ne peut vivre dans un  
pays sans un Président. C'est le Président qui  
imprime la dynamique du développement qu'il  
fait à son peuple. Et justement c'est le Président  
AKPITY qui en son temps, par son exhortation  
des populations rurales, nous a lancé dans les  
travaux champêtres en nous convainquant que  
c'est dans les travaux champêtres que nous  
allons trouver notre autonomie, notre épanouis-  
sement car nous pourrions alors parvenir  
à la satisfaction de nos besoins. Nous l'avons  
écouté et suivi et pouvons dire aujourd'hui  
qu'il a eu raison. Nous avec notre  
actuel Président, nous ne comprenons plus rien  
lui contrairement à AKPITY est là pour faire  
la promotion de l'Industrie et le dépend de  
notre survie. Il est venu pour mettre un  
terme à nos activités champêtres. Comment  
allons nous survivre alors? Nous ne pouvons  
accepter ça. Nous ne sommes pas intéressé  
par un quelconque dédommagement car  
quelque soit le montant, ça finira au  
bout d'un temps record alors que nos terres  
ne nous lâcheront jamais. Elle sera toujours

Des prix complètement à la baisse par rapport à la valeur que nous nous fixons pour nos terres. Nous ne sommes pas du tout partant pour céder nos terres. ⑥

4 - Notre impression est que l'Etat même une politique pour nous asphyxier. L'Etat est cette propriétaire de la terre mais autant qu'il nous tue, et creuse une fosse commune pour nous y enterrer tous ici à Tori-Sogbé et il pourra alors en toute liberté y développer sa politique industrielle. Nous n'avons d'ailleurs même pas d'argent pour mener les démarches pour faire les papiers demandés avant notre compensation. ⑦ Nous sommes des héritiers et n'avons aucun papier. Nous en avons parlé d'ailleurs à l'arrondissement qui a ~~pu~~ demandé que nous précisions les limites de nos domaines. ~~Mais~~ l'avons fait et jusqu'à là plus rien. Et vous voilà avec votre stance à nous parler de Zone Industrielle? Quel va être notre sort?

5 - Ce projet n'aboutira jamais s'il plaît à Dieu car nous refusons d'avoir à mourir de faim.

6 - Nous savons que nous n'avons aucune chance de travailler dans cette Zone économique sans diplôme. Dites nous alors plutôt de quelle



Les réponses données à des préoccupations  
et questions de vosurment comme huit

- Pour toutes les questions concernant le  
le dommagement, nous ne sommes pas habilités  
à vous donner des réponses. Tout ce que nous  
pouvons vous dire à ce niveau, et qu'il y a  
un cabinet "INSUICO" qui travaille en ce moment  
sur le terrain pour le PARE (Plan d'Action  
de Réinstallation et de compensation). Au bout  
de son travail, ce cabinet tiendra avec vous  
une séance comme celle-ci et sera plus en  
mesure de répondre à toutes vos questions sur  
la compensation et la réinstallation.

- Nous comprenons que l'être passé par beaucoup  
de frustration et de désillusion fait que aujourd'hui  
vous restez dubitatif en ce qui concerne les  
impacts positifs de la Zone Industrielle pour vous.  
Surtout en ce qui concerne la priorité de la  
main d'œuvre locale. Ce que vous avez subi  
dans le cas de la zone de l'aéroport continue  
de faire effet mais par rapport à cette réalité, nous  
ne pouvons rien vous dire d'autre que d'attendre  
d'avoir la patience d'attendre, et constater après  
que la réalité de la Zone Industrielle est différente.

- Concernant les fixations du coût de dédommage  
ment des terres entendues à la radio, nous n'avons



pas cette information. Mais savons qu'en son temps et avec le cabinet Insuco, vous aurez l'information réelle. (3)

- A notre avis la logique qui gouverne ce projet n'est pas celle de faire mal aux populations de Tori et de Zé. Ni l'état, ni le promoteur n'ont envisagé ce projet sous cet angle. Mais c'est une forte logique de développement du pays qui explique la décision de ce projet au niveau de l'état. Quant au promoteur, c'est dans la collaboration étroite avec les communautés riveraines qu'il souhaite travailler. Il souhaite être à votre écoute, communiquer pour pouvoir travailler dans l'harmonie avec vous, sans avoir à vous brimer mais en respectant vos droits.

- Dans les impacts positifs de même que les mesures d'atténuation et de bonification figure en bonne place la prise en compte des femmes, et les jeunes et des groupes vulnérables.

- D'une façon générale, notre équipe est venue vous restituer les résultats de l'EIES international de du projet de Zone Industrielle afin que vous vous l'appropriiez. Il serait vraiment plus profitable pour vous que vous mettez toute chose de côté pour vous ouvrir au dialogue. Sans dans la colère vous ne seriez pas capable de vous faire entendre et défendre vos intérêts.

La séance a pris fin après les remerciements de l'équipe de restitution aux participants et le mot de clôture du chef village.

ont signé.

<sup>C</sup>  
Ben  
ALLOU, Aobrien  
~~Ben~~

KOUTCHOTI Michel

~~Ben~~  
KPAHOUNKPA Benjamin.

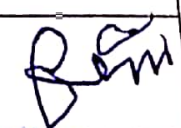
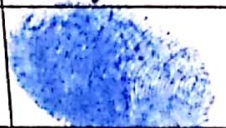
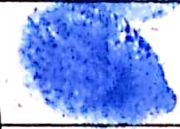
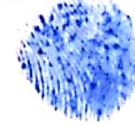


Commune de : TORI-BOSSITO  
 Arrondissement de : TORI-CADA  
 Village de : Sogbè

Date, le 10/11/2020

Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin



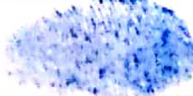
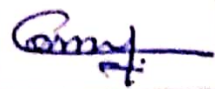

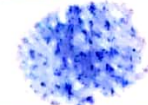
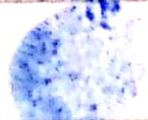

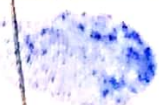
Liste de présence

N°	NOM et PRENOMS	H/F	Structure	Qualification	Adresse/ téléphone	Emargement
01	ALLOU Adrien	H	Village	CV Sogbè	97 188554	
02	KANMA Grégoire	H	"	Tailleur	-	
03	KINMAN Lomlan	H	"	Cultivateur	69121025	
04	DODG Diendonné	H	"	"	97468184	



anteagroup

N°	NOM et PRENOMS	H/ F	Qualification		Adresse/ téléphone	Emargement
05	ZOUNDE Léopold	H	Cultivateur	Village	67145364	
06	DANGBENON Victorin	H	Commerçant	II	97226182	<del>Signature</del>
07	MONDE Félix	H	Chauffeur	II	96600455	Signature
08	ALOU Jeflin	H	Cultivateur	II	51034065	
09	LOKONON Sésorin	H	II	II	96212825	Signature
10	ALOU Félicien	H	II	II	—	
11	KOUCHOMI Florent	H	II	II	—	<del>Signature</del>
12	KPAN/KPA Benjamin	H	II	II	97220375	Signature
13	ADONGBOU Josephine	F	II	II	—	

N°	NOM et PRENOMS	H/ F	Qualification	structure	Adresse/ téléphone	Emargement
14	KOUCHOMI Angelo	H	Cultivateur	village	67129351	
15	DOGBE André	H	"	"	69809580	
16	DAGBENDON Assogba	H	"	"	-	
17	DADO Florent	H	"	"	97139012	
18	DANSDU Moïse	H	"	"	90181391	
19	YOMI Paul	H	"	"	96115375	
20	DAGBENDON Martin	H	Carreleur	"	64785231	
21	KOUTCHOMI Vincent	H	Cultivateur	"	-	
22	HOVNYE Gladys	F	Revendeuse	"	-	





anteagroup

N°	NOM et PRENOMS	H/ F	Qualification	Structure	Adresse/ téléphone	Emargement
23	SOUBE Toussaint	F	Receveuse	Village	-	
24	KPAHOUNKPA Paul	H	Cultivateur	"	66738658	
25	AVICON Salomon	H	Volganisate	"	97967251	
26	KOKO Alain	H	Cultivateur	"	66415862	
27	FAKREDE Adele	F	Receveuse	"	-	
28	KOUCHOMI Jean	H	Cultivateur	"	90729908	
29	KIKI Albertine	F	Receveuse	"	-	
30	AVOUGNANKOU Josephine	F	"	"	-	
31	SOUNDE Justine	F	"	"	-	



anteagroup

N°	NOM et PRENOMS	H/F	Qualification	structure	Adresse/ téléphone	Emargement
32	KOUTCHOMI Béatrice	F	Vendeuse	Village	62071319	Cyff
33	ANAGONDU Pélagie	F	Revendeuse	"	-	
34	DJIVO Justine	F	"	"	-	
35	KPOSSA Nicolas	H	Cultivateur	"	96729631	<del>for</del>
36	DADO Pierre	H	CVA à la retraite	"	9676918	<del>for</del>
37	KPOSSA Dokoré	F	Cultivateur	"	-	
38	ANAGONDU Adogbo	F	"	"	-	
39	ADEL Moukénata	F	Revendeuse	"	-	
40	LOKONON Jeanette	F	"	"	66472267	



N°	NOM et PRENOMS	H/ F	Qualification	Structure	Adresse/ téléphone	Emargement
41	ABIDJ Eunice	F	Cultivatrice	Village	-	
42	LOKONON Pélagie	F	Conturière	"	-	
43	DOSSA Emilieenne	F	Revendase	"	-	
44	ADANDDROSSI Gafarou	H	Cultivateur	"	97336359	
45	KPOSSA Fidél	H	"	"	97383965	
46	AMOUSSOU Housson	H	"	"	66466951	
47	SOGBOSSE Clement	H	"	"	-	
48	HOUNTON Kpaboukpa	H	"	"	-	

11/11/2020

# Procès Verbal de la Consultation Publique de restitution des résultats de l'Etude d'Impact Environnemental et Social (EIES) Internationale de la Zone Industrielle de Glo-Djigbé dans le village de Zébè de l'arrondissement de Tori-Cade, Commune de Tori-Bossito

L'an 2020 et le mercredi 11 novembre a eu lieu à Zébè une séance de consultation Publique de restitution des résultats de l'EIES Internationale de la Zone Industrielle de Glo-Djigbé.

La séance a commencé à 16 h 20, et avait pour ordre du jour :

- 1- La Présentation des participants.
- 2- Le mot d'ouverture du chef village
- 3- La sensibilisation sur le covid 19
- 4- La restitution des résultats de l'EIES
- 5- La foire aux questions des participants
- 6- Réponses aux questions
- 7- Clôture.

Après les étapes de quatre (4) premiers points à l'ordre du jour, les questions posées par les participants se structurent comme suit :



2 - la restitution que vous venez de faire n'a pas exposé que ce qui est bien pour vous mais vous n'avez pas consulté la pop. et puis vous n'avez pas rendu public cette session. Je l'ai appris fortuitement.

Nous souhaitons que vous nous informiez du coût du dédommagement avant que nous n'adhérons à votre projet.

Nous avons été déjà grugés par l'état dans le cadre de l'aéroport nous ne nous laissons pas gruger ici.

2 - Nous reconnaissons que l'état est propriétaire de terre mais au moins prévenez nous avant de nous arracher nos biens!

3 - Et les terres sur lesquelles les riverains ont déjà enterré leurs parents comment va t'on faire lors de l'expropriation?

- ceux qui ont des terres et ne savent pas que ils sont expropriés comment seront ils informés? ceux qui n'ont pas de plaque sur leur terre comment ça va se passer?

4 - on nous arrache nos terres. L'état a tort le droit. Mais va t'on nous dédommager avant le début de travaux?

5 - le promoteur est-il vraiment prêt à respecter



nos droits ? va t'il respecter les engagements ?

6- Avec ce projet il y aura pollution ?  
nécessaire pour la population ? qu'en pensez-vous ?  
Qui va nous protéger ?

7- Quand est-ce que les travaux vont commencer ?  
Nous voudrions savoir pour nous apprêter ?

7- Il semble que le terrain pour lequel vous  
êtes là est de 16 000 ha ? depuis que que vous  
venez vous ne nous avez jamais parlé de l'impact  
de l'air nous dédommagement ? demandez-vous  
créer le phénomène de vol, et autres vices ?

- d'information ~~est~~ cette rencontre ~~est~~  
pas passer à tous les niveaux ?

8- On nous avait attribué 6 000 ha de la zone  
de l'aéroport et jusqu'ici rien. Que l'Etat travaille  
d'abord sur ~~la~~ la permission de l'aéroport. Qu'il  
finisse de dédommager la zone de l'aéroport.  
Ensuite il peut venir nous attribuer les terrains

Nous voulons avoir toute chose qu'il nous  
dit de coût du dédommagement. Nous ne craignons  
pas en cette histoire de prise en compte de la  
œuvre locale.

9- Pour nous les champs nous aide à régler  
nos problèmes financiers occasionnels. Si on  
nous les attribue qu'on nous dédommage.  
Au bout de 8 ans va t'on nous retourner



- ~~entre~~ allez vous procéder à la priorisation de la main d'œuvre locale? voilà que nous sommes de non lettrés.

En son temps vous allez amener des gens d'ailleurs et nous ~~publiés~~? c'est ce que nous sommes habitués à voir

12 - Avez vous fait une bonne étude avant de vouloir déplacer les personnes à exproprier? Nous ne le pensons pas sinon vous n'allez pas nous le dire seulement à 2 jours à l'avance

- L'IGN est venu, il y a 3 mois et nous ont dit que dans 3 ans on travaillera sur le site ~~etc~~ vous différenciez de ceux de l'IGN?

- Les réponses apportées à ses questions se résument de la façon suivante:

- Les séances avec tous les villages concernés eurent bien lieu sous Tori que dans Zè ont commencé il y a un an et nous avons suivi l'échelon hiérarchique, qui avant notre descente dans les villages avait notre planning et se chargeait d'informer le chef village qui à son tour par la voix des anciens publics informait le village. A Zèbè, nous avons rencontré les couches socio professionnelles impactées à savoir



les agriculteurs (exploitants, manœuvres)  
et propriétaires terriens

les jeunes, les femmes, les orphelins, les personnes  
vulnérables. Il y a eu plusieurs rencontres.  
Encore pour cette rencontre le Maire et ses  
adjoints du CA ~~ont~~ sont informés votre CV  
est informé et il a informé le crieur public  
qui a fait son travail depuis.

En résumé, la population de Zèbe a été  
bien consultée et la rencontre est bien  
rendue publique.

- Pour toutes les questions concernant  
le dédommagement, nous ne saurions vous  
apporter des réponses mais le cabinet INSUCO  
qui travaille en ce moment sur le Plan  
d'Action de Réinstallation et de compensation  
(PARC) le fera en son temps. Il vous  
informera également sur comment se  
fera l'expropriation.

- L'expropriation dans l'aéroport a été  
un fait qui vous a traumatisé, nous  
comprendons cela. Mais le présent projet  
est différent de celui de l'aéroport et ne peut  
se faire sur le site de l'aéroport.



- Le Plan de gestion Environnemental et Social s'impose au promoteur et de plus il est inscrit la priorisation de la main d'œuvre locale. Et il faut dire aussi que le promoteur fait preuve de beaucoup de volonté et de sérieux de communication avec vous pour la mise en œuvre des points de collaboration qui y sont et qui sont, en plus, la priorisation de la main d'œuvre locale.

- La pollution, comme impact négatif qui mais elle sera bien faible et le promoteur doit y veiller.

- Vous n'aurez plus accès à vos terres au bout des huit (8) ans qui vont consacrer la fin des 3 phases du projet. En lieu et place de vos terres seront érigés les infrastructures que je vous ai montrés lors de ma présentation.

- L'IGN est venue sur le terrain sans doute peu dans le cadre de ce projet mais. ~~et~~ ce sont différentes équipes qui travaillent sur le terrain en ce moment. La nôtre est celle qui a été chargée de l'étude d'impact Environnemental et Social (EIES), sans être la même équipe que l'IGN, nous

données tous la pour le même projet. ⑦

De façon globale, notre équipe est venue à vous aujourd'hui pour vous restituer les résultats de l'EIES internationale du projet de Zone Industrielle pour que vous vous l'appropriiez. Et nous voilà au bout de la rencontre. Nous vous remercions pour votre participation.

La séance a pris fin après le mot de clôture du CV qui a invité les administrés à répondre présents aux appels du créneau public aux diverses séances.

Ont signé



Koffi Blaise ADJAHANOU



DAGA Rigobert




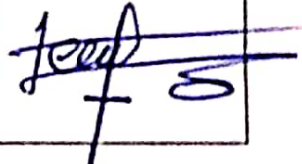



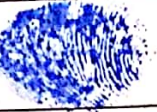
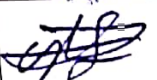


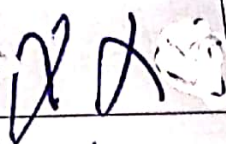
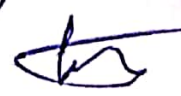


Date, le 12/11/2020

Commune de : TORI-BOSSITO  
Arrondissement de : Tori-lada  
Village de : Zébè

Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin




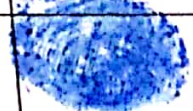




Liste de présence

N°	NOM et PRENOMS	H/F	Structure	Qualification	Adresse/téléphone	Emargement
01	ADJIHANOU Koffi Blaise	H	village	CV Zébè	96225750	
02	ANDCEHEN Martin	H	"	Cultivateur	97239973	
03	SOGBONOU Daniel	H	"	Photographe	97059472	
4	SDSSOU Agbandan H. Clément	H	"	soudeur à l'arc	95405178	


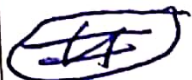

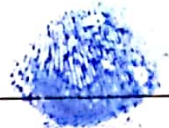
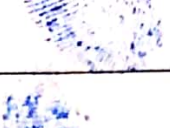



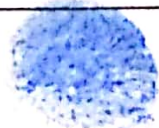
N°	NOM et PRENOMS	H/F	Qualification		Adresse/ téléphone	Emargement
05	BOGLO Julien	H	Maçon	village	96007569	
06	AGBIN Eric	H	Cultivateur	"	97719134	
07	GREGBERT Simplice	H	"	"	97642662	
08	SINHOU Cobvi	H	Pasteur	Ouidoh	972174-69	
09	ODOUN Jokerre	F	Revendeuse	village	96042201	COO
10	AYOCETIEN Germain	H	Chauffeur	"		
11	SOHOU Sabin	H	Commerçant	"	96228478	
12	AHLOU Claude	H	Cultivateur	"	97599987	
13	ADESSI Casimir	H	Menuisier	"	97724766	






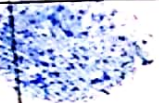
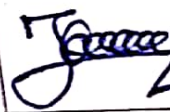
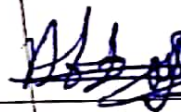
N°	NOM et PRENOMS	H/F	anteagroup Qualification	structure	Adresse/ téléphone	Emargement
14	Chanignan Victorien et son épouse	H	Directeur société	village	97126258	
15	HODEHOU Roger	H	Tourneur		07224435	
16	BATH Rigobert	H	Elevageur		-	
17	ORE S. Pierre	H	Soudureur		97863433	
18	ADAVI F. Benoit	H	Cultivateur		65474778	
19	VODONON Alexis	H	soudureur		95580978	
20	AMAGD Marcel	H	Pasteur		97699880	
21	GAGA Adeleud	F	Revendeuse		-	
22	GAGA Victorin	H	Cultivateur		97752280	

N°	NOM et PRENOMS	H/ F	Qualification	structure	Adresse/ téléphone	Emargement
23	ADJI HANOU François	H	Cultivateur	Village	96 00 94 98	
24	AZANGBE Louis	H			97 93 60 24	
25	AHODOU Benjamin	H	Cultivateur		97 55 01 98	
26	AGBIN Finagbon	H			66 00 93 58	
27	AKOUEHIN Celestin	H	Chauffeur		97 55 09 84	
28	LALY Germain	H	Cultivateur		67 44 67 05	
29	ADJI HANOU André	H	Cultivateur		62 04 71 50	
30	DAGA Benjamin	H			—	

anteagroup

N°	NOM et PRENOMS	H/F	Qualification		Adresse/ téléphone	Emargement
31	GAGA Antoine	H	Cultivateur	Village	97751460	
32	DEWA Sourou	H	"	"	97380592	
33	HOUNSDU Victorin	H	Cultivateur	"	97752301	
34	AHLOU Pierre	H	"	"	-	
35	LALY Louis	H	"	"	97789700	
36	DANGBENON Cyprien	H	"	"	97998916	
37	LALY T. Cosme	H	"	"	67616990	
38	AGBIN Yeton	H	"	"	-	
39	TGBE Marcelin	H	"	"	97247393	



N°	NOM et PRENOMS	H/ F	Qualification	Structure	Adresse/ téléphone	Emargement
40	JAGA Rigobert	H	Cultivateur	Village	97657569	
41	KOUTON Gnonlonfon	H	11	11	96594944	
42	AGBIN Daniel	H	11	11	97513164	
43	LALY Tchihouènou	H	11	11	97678965	
44	HODEHOU Z. Jonas	H	Tourneur	11	94902131	
45	AGBIN Dorothe	H	Chauffeur	11	95862873	

PV DE CONSULTATIONS PUBLIQUE  
DE RESTITUTION DES RESULTATS DE L'EIES  
INTERNATIONAL DE PROJET DE ZONE INDUSTRIELLE  
DE GLO-DJIGBE PAR ARISE BENIN (Mairie de ZÈ)

L'an deux mil vingt et le 03 Novembre s'est tenue à la mairie de Zè la séance publique de consultation et de restitution des résultats de l'EIES du Projet de Zone industrielle de Glo - Djigbé par ARISE Benin.

Étaient présents à la séance des autorités et cadres de la mairie de ZÈ (voir liste de présence)  
L'ordre du jour et de la séance est le suivant:

- 1 - Présentation des participants.
- 2 - Mot d'ouverture du Maire
- 3 - Présentation des mesures COVID-19
- 4 - Présentation du Power-Point
- 5 - Faire aux questions

Après la présentation des participants, la présidente a donné la parole au Maire pour ouvrir la séance.

Le Maire a remercié le promoteur et l'assistance et à trouver juste cette séance et opportune.

La présentation du power point a permis de mieux comprendre le sujet de la séance et les mesures d'atténuation du projet.



Les questions suivantes ont été posées par les participants :

1. Quelles relations existe-t-il entre la zone économique spéciale qui couvre 1000 ha et la zone industrielle qui couvre 1.600 ha?
  2. Que gagne l'Etat Béninois dans son partenariat avec OLAM/ARISE?  
Sera-t-il juste des avances pour les Béninois?
  3. Dans le processus d'expropriation, le projet pourrait-il trouver un endroit pour reloger les riverains affectés?  
Si c'est le cas, il faut mieux qu'il pense à un même espace pour conserver le noyau culturel villageois.
  4. Le dédommagement se fera à quel coût? Nous avons besoin de savoir.
  5. L'ananas pain de sucre, le label Béninois se situe dans cette zone, si cette zone est prise comme zone économique, ceci équivaut à enterrer définitivement la filière et c'est la faim pour les populations. En est-on bien conscient?
  6. Il y a actuellement une difficulté de gestion des dossiers de la zone prioritaire pour le dédommagement.  
Qu'est-ce qu'il faut faire?
  7. Dans le processus d'expropriation il faut reconstituer les villages pour préserver le tissu social et culturel.
- A toutes ces questions, les réponses apportées se résument comme suit :

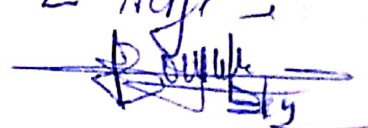


- ~~Les questions suivantes ont été posées par le public :~~
- La zone industrielle se retrouve dans la zone économique qui s'étend elle jusqu'à Allada et est constituée de 3 zones.
  - L'Etat gagne d'existence d'une zone industrielle qui va sûrement apporter des devises et va permettre aux populations d'avoir des emplois.
  - L'expropriation concerne plus les champs que les habitations et donc le problème de préservation du noyau villageois et tissu social ne se pose pas.
  - La perte de la variété de l'ananas pain de sucre est le sacrifice que doit consentir des Béninois pour la mise en place de ce projet.
  - Pour toutes les questions concernant le dédommagement (Coût, stratégie à mettre en place) le cabinet INSUCO qui travaille en ce moment sur le plan d'action de réinstallation et de compensation sera plus habilité à donner les réponses appropriées à l'issue de son travail.

Les points à l'ordre du jour étant épuisés et les questions élucidées, la séance de consultation publique a pris fin sur les mots de clôture du Maire et dans une bonne ambiance. Démarrée à 16h10min elle s'est achevée à 17h30min

ont signé

  
Le Maire Amade Moussa



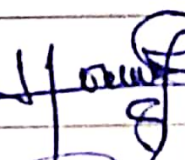

2<sup>e</sup> Adjt  


Date, le 03/11/2020

Commune de : ZE  
Arrondissement de : ZE  
Village de :



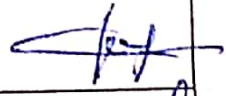
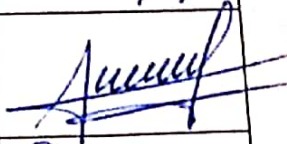
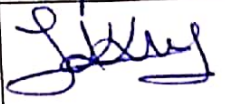

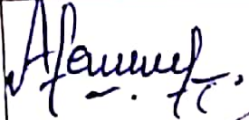

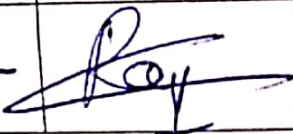
**Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

Liste de présence

N°	NOM et PRENOMS	H/F	Structure	Qualification	Adresse/ téléphone	Emargement
1	AMA DE Moussa	H	Mairie Ze	Maire	62006868	
2	HOUEDENOU Bernard	H	Mairie Ze	Le Adjt Maire	9819 9182	
3	HOUNKPATIN Gilbert	H	Mairie Ze	SG Maire	66519255	
4	AVOSSE C. Wilfried	H	Mairie Ze	C/SAC	97349318	



# anteagroup

N°	NOM et PRENOMS	H/ F	Qualification		Adresse/ téléphone	Emargement
5	AMMO A. Agath	F	chef cellule contrôle marchés Publics	cellule de contrôle	95 23 78 79	
6	T. Simon DINGNIGBEDE	M	chef Service des affaires domaniales et environnementales		97 26 98 34	
7	ADJODEKPO Faustin	M	Président du S.A. Représentant de T.M/GSO		97 25 84 28	
8	ABIDNA O. L. Estelle	F	Chef Service du développement local et planification	Mairie de Zé	96 44 77 50	
9	DAGA E. Juliette	F	chef Services Affaires Général	Mairie Zé	97 06 36 86	
10	KPODJEOD Sylvie	F	Resp. Volet Sociét	ANTEA	96 99 53 00	
11	TOSSAH Isaac	M	Assist. Resp. Volet sc	ANTEA	96 06 20 06	
12	MOUTANGOU Herbert	M	responsable Commercial	SIP1	61 45 00 04	
13	CISSE Rahkmatoula	F	Responsable enviro. social	SIP1	96 97 17 17	

06/  
11/2020

# Procès Verbal de la consultation Publique de restitution des résultats de l'EIES internationale de la Zone Industrielle de Glo-Djigbe à Agbodjédo dans l'arron- dissement de Tangbo-Djévié, Commune de Zé

L'an 2020 et le vendredi 06 novembre,  
s'est tenue une séance de consultation publique  
de restitution des résultats de l'étude d'Impact  
Environnemental et Social (EIES) Internationale  
de la zone Industrielle de Glo-Djigbe.

Prévue pour commencer à 16 h, la séance  
a effectivement débuté à 16 h 50.

L'ordre du jour se structure comme suit:

- 1- Présentation de l'équipe de restitution  
et des participants
- 2- Mot d'ouverture du chef village
- 3- Sensibilisation sur le COVID 19
- 4- Présentation de l'objet du jour
- 5- Faire aux questions, préoccupations
- 6- Réponses aux questions et préoccupations
- 7- Clôture de la séance

Après la présentation des participants et  
l'énoncé de l'objet de la séance, le chef  
du village procède à l'ouverture de la séance  
en remerciant les uns et les autres et en invitant



La population a une écoute attentive de la présentation des résultats de l'ÉIES et a posé toutes leurs préoccupations. Puis l'étape de sensibilisation sur le COVID 19 fut abordée et l'assemblée fut invitée au lavage des mains puis au port des caches nez qui leur a été distribué.

Le point 4 de l'ordre du jour a été abordé et la présentation du projet, de ses impacts positifs et négatifs ont été exposés.

Cette présentation a été suivie de la formulation des préoccupations et recommandations des populations qui se structurent comme suit:

1 - Nous souhaiterions que la provision de la main d'œuvre locale soit effectivement une réalité quand la réalisation du projet commencera et ceci surtout concernant les femmes qui du fait de l'expropriation des la perte des terres par les propriétaires terriens, n'auront plus eu aller d'approvisionner gratuitement en bois de chauffe et ne pourront plus faire la transformation du bois en charbon. Toute chose qui favorisait la cuisson domestique.

Il faudrait également que sous la provision de la main d'œuvre locale que les jeunes du village soient également prise en compte.



2 - La réalité est que rien que d'imaginer la perte de nos terres, nous ressentons une grande peur résultant de l'incertitude que cette future réalité souleve en nous. Or allons-nous devenir, nous qui ne savons rien faire d'autre que l'agriculture ? Et surtout que nous n'avons aucune idée du montant du dédommagement qui va nous être versé.

3 - La terre appartient à l'état, certes et nous n'avons aucune force pour nous opposer à lui si le Président décide de nous exproprier, cependant, il serait plus que opportun qu'il fasse en sorte que nous puissions continuer de nous nourrir et que nous ne mourrions pas de faim.

4 - Vu tous les vices que ce projet peut provoquer dans les villages impatés, nous souhaiterions que la priorité de la main d'œuvre locale soit respectée et qu'en son temps, il ne nous soit pas opposer les diplômes pour notre recrutement. Toute chose qui justifierait que les recruteurs aillent chercher leur personnel ailleurs. Aussi, nous espérons que la proximité de la zone industrielle des villages ne serait pas

ne devrait pas au jour cause de notre symboles  
sous le prétexte d'effets nocifs des industries  
pour les hommes ?

5 - Quelle est la stratégie mise en place  
par l'Etat pour l'évaluation réelle et  
juste de la valeur des biens que nous  
allons perdre sous ce projet ? et quel quel  
sera le montant fixé pour nous dédommager ?

6 - Il faut vraiment que la stratégie de  
dédommagement tienne compte de tous les  
paramètres et que ceux qui déjà sous le  
cas de l'aéroport ont subi une première expropriation  
et avec le peu d'argent reçu de cette expropriation  
se sont achetés de nouvelles terres ici à  
agbodjedo et qui seront de nouveau expropriés,  
soit dédommager conséquemment afin de pouvoir  
trouver où se loger ailleurs.

7 - Quelle sera le sort de ceux (les exploitants)  
qui ont déjà leurs plantations d'amanes mûres  
et qui sont prêt à récolter ? Nous laissera  
t-on le temps de récolte ?

8 - Quel sort réservera t-on aux manœuvres ?  
ceux qui ne sont ni propriétaires, ni exploitants  
mais prête mains fortes aux exploitants  
contre rémunération ?



Les réponses apportées à ces préoccupations et recommandations de la population du village de Agbadjé de l'arrondissement de Tongbo - Djévié sous la commune de Zè se résument comme suit :

- Le projet de Zone Economique Industrielle n'est pas un projet qui vise à déplacer la guerre aux populations des villages impactés. Pas plus l'état que le promoteur ne sont sous une de faire mal aux populations. C'est un projet de développement de la zone et le promoteur entend travailler la main sous la main avec les communautés.
- Tous concernant les questions sur le dédommagement, les stratégies mises en place, le coût... la population aura des réponses avec le cabinet INSUCO qui travaille en ce moment sur le terrain sur le volet Plan d'Action de Reinstallation et de Compensation (PARC). A l'issue de son travail, ce cabinet vous fera un point de ses travaux et lors d'une séance comme celle-ci et vous donnera des réponses plus précises sur vos questions de dédommagement.



- Il y a eu ce moment une commission mise en place pour le recensement de propriétés saines et exploitables impactées. Le chef village de Agbodjido est membre de cette commission et vous pouvez vous rapprocher de lui pour vos préoccupations sur les questions sensibles de procédures et de recensement.

- Dans les recommandations de l'EIES, la priorité de la main d'œuvre locale est mise en avant et nous pensons que le promoteur a pris acte et mettra en place les dispositions pour que cette recommandation soit effective dans le village et surtout pour les femmes et les personnes vulnérables sur lesquelles un accent particulier est mis.

- L'Etat aurait pu prendre les terres en contrainte et déplacer simplement les villages qui y sont, mais il a préféré y laisser les villages, preuve qu'il a le souci du maintien du tissu associatif, de l'harmonie communautaire et culturelle.

Par ailleurs dans la présentation, nous avons montré un espace vert qui sera développé par le promoteur sur le site, nous avons parlé de la création d'un espace de traitement des eaux usées, des déchets. Trois éléments



qui participeront fortement à la réduction  
des effets négatifs des industries pour les  
populations des villages riverains.

Toutes solutions qui nous portent à dire  
que la logique de l'État et du promoteur  
n'est pas d'expulser à la longue les populations  
de leurs écosystèmes culturels sous le prétexte  
de leur proximité avec la zone industrielle.

Le chef village a pris la parole pour  
confirmer son appartenance à la commission  
de recensement des personnes impliquées et de  
définition des stratégies de dédommagement.  
Il a invité la population à venir à lui  
pour ses préoccupations sur le sujet.

D'une façon générale l'équipe de  
restitution des résultats de l'EIES

internationale a représenté la mission  
du jour qui est de faire cette consultation

publique avec la population du village  
d'Agbondjele afin de lui permettre  
de s'approprier les résultats de l'EIES.

La séance a prit fin après les  
remerciement de chacun des deux parties.  
La population à travers son chef village  
et l'équipe Antéla - Benin - Arise.

Ont signé

Zanminou Calixte

C.V. Agbodjido *[Signature]*

KOUDESSA Pascal

*[Signature]*

NONNON form  
Louis

*[Signature]*

HOUNKRATIN Victorin




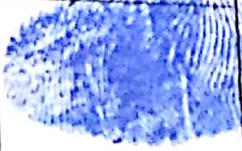
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Commune de : Zê  
 Arrondissement de : Tangbo-Djèvi  
 Village de : Agbondjedo

Date, le 06/11/2020

Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin

Liste de présence

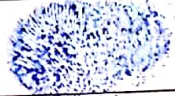

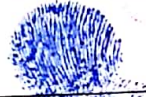
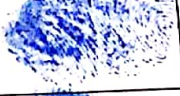




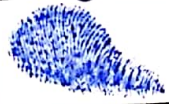
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01	ZANRENDU Calixte	H	Village	Producteur	56639023	
02	HONNKPATIN Victorin	H	Village	Eleveur	97399509	
03	KOUDESSA Pascal	H	11	Cultivateur	61788614	
4	GANSE Célestine	F	11	11	—	





anteagroup

N°	NOM et PRENOMS	H/F	Qualification		Adresse/ téléphone	Emargement
05	KOUDEDO Josephine	F	Cultivatrice	Village	—	#
06	AKOJETIN AKOYAVI	F	Couturière	"	—	
07	HOUNKPATIN Christine	F	Cultivat	"	—	
08	KINTOLO Adèle	F	"	"	—	
09	MINAVON Rodolphe	H	Cultivat	"	—	
10	HOUNKPATIN Wilfried	H	Elève	"	60730467	LA
11	KOUKPOU Clotilde	F	Revenduse	"	—	
12	HOUNVI Mathurin	H	Coiffeur	"	51917093	
13	LOGOHOU Rodolphe	H	Apprenti Mécano	"	—	

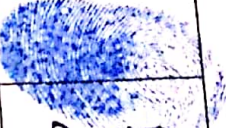
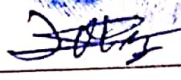
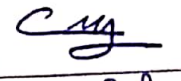
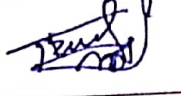
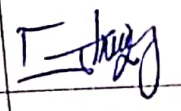
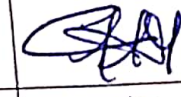

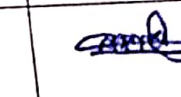
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14	HOUNYI Noël	H	Cultivateur	Village	60731877	
15	DOSSO Claude	H	Chauffeur	"	86745540	
16	DOSSA Madeleine	F	Revendeuse	"	-	
17	LOKOSSOU Melanie	F	Cultivatrice	"	-	
18	SOGBEHITO Victorine	F	Coiffeuse	"	-	
19	MAKINDOU Antoinette	F	Revendeuse	"	92740614	
20	KARPO Sylvie	F	Conturière	"	64201672	
21	DOSSOU Dorcas	F	Ménagère	"	94531392	
22	HOUKARRIN Corine	F	Coiffeuse	"	-	





anteagroup

N°	NOM et PRENOMS	H/F	Qualification		Adresse/ téléphone	Emargement
23	HESSOU Rosalie	F	Couturière	Village	62567973	
24	ANAGONDU Josephine	F	"	"	66260229	
25	HOUSSOU Firmine	F	Revendeuse	"	63071299	
26	LOGLOHOU Guillaume	H	Machiniste	"	61982719	
27	VOUDOUN S. M. Cobex	H	Chauffeur	"	97306524	
28	KINTOLO Anasthasie	F	Aide-Soignante	"	97475947	
29	LORDSSOU Olivier	H	Enseignant	"	65532629	
30	MIHAMON Hypolite	H	Cultivateur	"	95698872	
31	AVALIME Valentin	H	Maçon	"	943272038	

N°	NOM et PRENOMS	H/ F	Qualification		Adresse/ téléphone	Emargement
32	GREVODE Marcellin	H	Cultivateur	Village	68364944	
33	MDONKPO Martin	H	"	"	60409745	
34	NDOUNDE A. Joachim	H	"	"	91536101	
35	BOSSOU Vital	H	Etudiant	"	96843451	
36	GNONLONFOD Louis	H	Resendeur	"	97516090	
37	MDONKPATIN Midard	H	Photographe	"	-	
38	MINAMON François	H	Cultivateur	"	95019736	
39	AHD Christian	H	Electricité Bâtiment	"	63548133	



anteagroup

N°	NOM et PRENOMS	H/ F	Qualification		Adresse/ téléphone	Emargement
40	HOUNGA Etard	H	Cultivateur	Village	68293285	
41	MINAMON Mathias	H	Photographe	"	94511405	
42	AVALI <del>ME</del> Alexis	H	Cultivateur	"	-	
43	ASSINDUYO Rosine	F	"	"	-	
44	DANGBENDU Ruffine	F	"	"	-	
45	AMOUSSOU Diane	F	"	"	-	
46	KINTOHOU Antoinette	F	"	"	-	
47	DOSSA Christiane	F	"	"	-	
48	DOVONON Boris	H	Chauffeur Poids lourd	"	60542046	



# Procès Verbal de la consultation Publique de restitution des résultats de d'EIES Internationale de la Zone Industrielle de Glo-Djigbé à Anavé sous le

L'an 2020 et le Vendredi 26 novembre  
s'est tenue une séance de consultation Publique  
de restitution des résultats de d'EIES de la  
Zone Industrielle de Glo-Djigbé dans le village de  
Anavé prévu pour commencer à 13h, la séance a effective-  
ment commencé à 13h30 et avait pour ordre  
du jour :

- 1 - La présentation des participants
- 2 - Le mot d'ouverture du chef village
- 3 - La sensibilisation COVID-19
- 4 - La présentation des résultats de d'EIES
- 5 - La Foire aux questions.

Après donc la présentation des participants  
le chef village a dit son mot d'ouverture de la  
séance de restitution ensuite les participants ont  
été invités à se laver les mains et les caches nez  
ont été distribués.

La présentation des résultats de d'EIES a  
été faite.

Les préoccupations et questions des  
participants se structurent comme suit :



① - Pourquoi avoir mis zone Industrielle de G10-Djigbe alors que les terres expropriées appartiennent aux populations de zone avoisinantes de Tangbo-Djigbe? c'est très frustrant pour nous. Il faut corriger impérativement ça.

② - Quel est la stratégie mise en place pour épargner et respecter la forêt sacrée?

③ - Quand est-ce que les populations seront indemnifiées? Est-ce que ça se fera t-il par phase?

④ - Nous aimerions que la dynamique avec lequel ARISE a commencé ne s'émousse pas en chemin. Et que ce ne soit pas du leurre.

⑤ La proximité d'une zone industrielle avec les villages ne peut-elle pas à la longue être un problème obligeant à demander aux villageois de se déplacer?

⑥ L'actuelle périmètre de ARISE est trop rapproché du village. Nous avions parlé de ça dans nos précédentes échanges et espérons que vous nous apporterez de bonnes nouvelles mais jusque là nous n'aborder rien dans ce sens.

⑦ L'issue du travail du cabinet INSUCO qui travaille actuellement sur le site et enregistre les biens, sera t-il de détruire nos champs?

Les réponses apportées à ces préoccupations



se structurent comme suit

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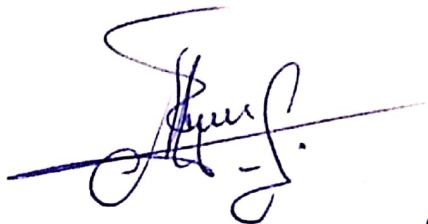
- Le nom Glo-Djigbe est donné sous une logique globale de développement de la Zone depuis l'aéroport jusqu'à Allada (Zone dite ZES). Cette logique n'a rien avoir par rapport à la promotion du nom d'une commune au détriment de celles qui ont réellement données leurs périmètres.

- Toutes les questions sur la stratégie pour épargner la forêt sacrée d'Anané, la stratégie d'expropriation, le coût des dédommagement trouveront réponses auprès du cabinet INSU CO, qui une fois au terme de son étude sur le Plan d'Action de Réinstallation et de Compensation (PARC), organisera une séance de restitution au cours de laquelle vous aurez les réponses appropriées.

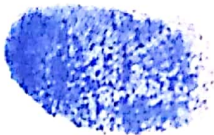
- Le personnel de ARISE présent à cette séance a enregistré votre souhait du maintien d'une dynamique continue par le promoteur et sera votre porte parole.

- Nous ne pensons pas que la proximité des villages avec la zone Industrielle sera un jour cause de leur expulsion car le promoteur est astreint à opérer une bonne gestion des émanations sources de pollution. De plus si l'état a choisi de laisser les villages c'est qu'il a à cœur de sauvegarder les noyaux villageois.

La séance a pris fin à 15h30 après les mots de remerciement des participants.  
ONT signé.



KPA.TINVO Norbert

DOMAGO Prosper

KPATINVO Odjo

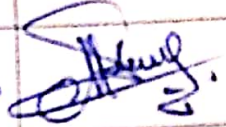

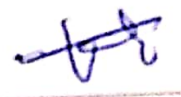



Date, le 06/11/20

Commune de : Zè  
Arrondissement de : Tangbo - Djèrè  
Village de : Anané

Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin

Liste de présence

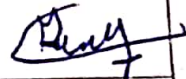





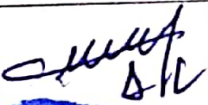
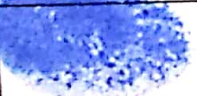

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01	KPATIMMO Norbert	H	Village	chef Village	97938236	
02	AFFOVEDÉ Nicolas	H	Village	cultivateur	64057437	
03	ANAGNONO Lucien	H	"	"	97845106	
04	NOUMANDON Alain	H	"	Chauffeur	65676777	




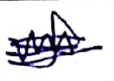


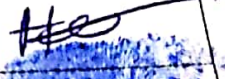


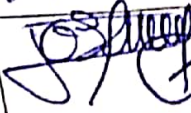
anteagroup


N°	NOM et PRENOMS	H/F	Qualification		Adresse/ téléphone	Emargement
05	NDUMANKEN Ferre	H	Cultivateur	Village	91290903	
06	KPATINVO Dogo	H	"	"	-	
07	NDUMANKEN K. Fidèle	H	Producteur	"	95199946	
08	DOMAGO Olivier	H	Chauffeur	"	62696075	
09	DOMAGO Tatchégnon	H	Cultivateur	"	-	
10	DOMAGO Pierre	H	Plombier	"	66472853	
11	KPATINVO Lucien	H	Cultivateur	"	97151436	
12	DOMAGO Eugène	H	"	"	66668766	
13	KPATINVO Pierre	H	"	"	61690480	

anteagroup

N°	NOM et PRENOMS	H/F	Qualification		Adresse/ téléphone	Emargement
14	NDOMARON Paul	H	Cultivateur	Village	60768065	
15	AFFOVEDÉ Emile	H	Chauffeur	"	97257563	
16	DOMAGO Paul	H	Cultivateur	"	91781559	
17	DOMAGO R. Raymond	H	"	"	62787047	
18	DOMAGO Alfred	H	"	"	96640451	
19	KPATINDO Isaac	H	"	"	65963101	
20	DOMAGO Louis	H	Chauffeur	"	97357903	
21	DOMAGO Prosper	H	Cultivateur	"	68114532	
22	AFFOVEDÉ André	H	"	"	97591731	



N°	NOM et PRENOMS	H/F	Qualification		Adresse/ téléphone	Emargement
23	NDUMAKON Bernard	H	Cultivateur	Village	63412274	
24	DOMAGO Anon	H	Elève	"	91780293	
25	DOMAGO Marcel	H	Cultivateur	"	97993147	
26	KLOGBO Clement	H	Chauffeur	"	90031003	
27	HOUNGUEYO Grégoire	H	"	"	94851550	
28	AFOVEDE Hounsa	H	Cultivateur	"	—	
29	DOMAGO Octave	H	"	"	69348672	
30	KPODJEDD Sylvie	F	Resp. volet social	ANTEA	96985300	

N°	NOM et PRENOMS	H/ F	Qualification		Adresse/ téléphone	Emargement
31	TOSSAH Isaac	H	Assistant Resp. Vilet sl	ANTEA	96062006	Hennip.
32	CISSE Rahkmatoulah	F	Resp. Env. sl	SIFI	9697777	C. R
33	MOUTANGOU Herbert	H	Resp Commercial	SIFI	61250004	<del>CF</del>
34	KPOW DEHOU Charly	H	Agent MTN	Village	97485660	Ryff
35	GNANHO Antoine	H	Menuisier	C1	95048220	Hennip.
36	HODNSA Pascaline	F	Continière	U	-	



# Procès verbal de la consultation Publique de restitution des résultats de l'EIES internationale de la Zone Industrielle de Glo-Djigbé à Djitin-Aga

L'an 2020 et le mercredi 04 Novembre a eu lieu dans le village de Djitin-Aga de l'arrondissement de Tangbo-Djèvié, Commune de Zè, une séance de consultation Publique des résultats de l'étude d'Impact Environnemental et Sociale Internationale de la Zone Industrielle de Glo-Djigbé.

La séance qui était prévue pour 16 h a effectivement commencé à 16 h 30 et avait pour ordre du jour

- 1- La Présentation des participants
- 2- Le mot d'ouverture du chef village
- 3- La présentation des mesures COVID19
- 4- La Restitution de l'EIES
- 5- La collecte des questions
- 6- Les réponses aux questions
- 7- clôture de la séance.

Après le déroulement des 4 premiers points, les participants ont formulé des questions qui se présentent comme suit :

① - Où irons nous avec ce projet qui nous  
dessaie de nos terres après l'aéroport?  
- Comment allons nous vivre?

② - Je ne comprends plus où je suis. moi j'ai  
mes terres à Tori et l'IGN avait commencé des  
délimitations par Tori avant d'arriver ici.  
Moi je n'ai pas retrouvé mon nom sur la  
liste de l'arrondissement et de la mairie.  
Ne sentils pas encore arriver à mon niveau  
Je ne voudrais pas qu'après, bien qu'étant  
présents mon nom soit complètement absent de la  
liste.

③ - Est-ce que notre dédommagement sera à la  
limite de ce que représente pour nous nos terres  
qu'on nous arrache? va t'on nous trouver d'autres  
terres?

④ - De 20 000 ha, nous entendons 26 000 ha puis  
400 ha. On a même entendu parler de 20 ha.  
Moi je ne me retrouve plus. Qu'en est-il?

⑤ - Qu'est-ce qui est prévu pour ceux qui ont leur  
plantation d'ananas et qui espère et se sont  
planifiés pour dans deux ans?

⑥ - Va t'en nous recruter et puis c'est tout?

⑦ - Quel travail peut-on donner aux ~~attachés~~ aux  
non lettrés dans le projet?

⑧ - N'allez-vous pas recruter en lieu et place  
des populations impactées d'autres personnes venues  
d'ailleurs?



1 - Tous les villages impactés que vous avez cités de même que l'arrondissement et la commune, nulle part ne figure Glo-Djigbé et pourtant, sur le projet est dénommé Zone Industrielle de Glo-Djigbé? Pourquoi?

2 - ⑩ - Aujourd'hui ~~est~~ les champs qui ont été pris.

Nous espérons que demain vous n'allez pas nous expulser de nos villages sous prétexte de notre proximité de l'aéroport et de la zone industrielle qui produit des émissions et déchets toxiques pour l'homme donc pour nous

3 - ⑪ - Quel sort réserve t'on à nous autre qui avons déjà été chassés <sup>de chez nos pères</sup> de la zone de l'aéroport et qui sommes maintenant ~~devenus~~ <sup>ici</sup> dans la maison de notre oncle qui ~~gît~~ <sup>est</sup> ou va bientôt nous réexpatrier? Cela ne ressemble t'il pas à un rachat?

⑫ - Ne ~~vous~~ t'on pas nous exiger lors du recrutement des diplômes? Ne nous exiger pas de diplômes avant de nous recruter.

Les réponses suivantes ont été apportées aux questions formulées par la population :

- Le nom de Glo-Djigbé a été donné



Dans une logique de développement global de la zone depuis l'aéroport jusqu'à toute la zone dite économique (ZES) qui s'étend sur 10 000 ha. Les 1600 ha de la zone Industrielle sont compris dans les 10 000 ha de la ZES.

- Vous aurez toutes vos réponses sur les stratégies d'expropriation, le coût de l'indemnité avec le cabinet INSUCO et l'issue de son travail sur le Plan d'Action de Réinstallation et de compensation (PARC)

- Les représentants du promoteur présents à cette séance ont enregistré vos appréhensions sur les questions du recrutement de la main d'œuvre locale et y veilleront en son temps

- Il est important si les renseignements des personnes impactées ont commencé que vous vous rapprochiez de l'arrondissement et prenez les pour prendre les informations juste et aussi formuler vos plaintes. Ne restez surtout pas enfermé. Personne ne vous

apportera l'information à domicile. (5)

→ Nous ne pensons pas que vous devriez être expulsé de vos village du fait de vos proximité de la Zone industrielle du fait des émanation toxiques. Le promoteurs prendra assez de mesure pour la gestion de ces émanations et puis l'Etat aurait pu choisir de prendre la zone ou continuer mais ne l'a pas fait. Soyez donc tranquille.  
La séance a pris fin sur la note de satisfaction de tous les participants et sur les mots de remerciement de l'équipe.

ont signé

*P. Houessa*

HOUESSA Rigobert (conseiller)

*S. Sognonde*

SOGNONDE Toussaint (conseiller)



Date, le 04/11/2020

Commune de : Zè  
Arrondissement de : Tangbo-Ijévié  
Village de : Ijirin-Aga

Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin

Liste de présence

N°	NOM et PRENOMS	H/F	Structure	Qualification	Adresse/ téléphone	Emargement
01	HOUESSA Rigobert	H	Village	Con Exploitant Agricole	64534059	Thuy
02	NDUGBOGNON Yematin	H	Village	Cultivateur	98591125	A
03	TENONTIO Vincent	H	Village	Producteur agricole	62553566	Hamdy
04	TENONTIO Paul	H	Village	Cultivateur	-	W



anteagroup

N°	NOM et PRENOMS	H/F	Qualification	S	Adresse/ téléphone	Emargement
05	KOUDEO Honore	H	Organisateur	Village	99278580	
06	TENDONTO Jerome	H	Cultivateur	"	—	
07	HOUNGBEMIN Sostu Pierre	H	"	"	65848499	
08	KPOSSA Bertin	H	Maçon	"	97427027	
09	TELEHOUE Fabrice	H	Etudiant	"	60536856	
10	SOGNONDE samuel	H	Matelassier	"	—	
11	SOGNONDE C. Pierre	H	Etudiant	"	61721182	
12	HOUNGBEME Saron	H	Cultivateur	"	—	
	SOGNONDE Christophe	H	Etudiant	"	67691863	



anteagroup

N°	NOM et PRENOMS	H/ F	Qualification	Structure	Adresse/ téléphone	Emargement
14	SONANGNON Goudjo	H	Maçon	Village	99030205	
15	SAGBO Pierre	H	Cultivateur	"	94716003	
16	BOGNONDE Bernard	H	Elève	"	68446511	
17	BOGNON DE Moïse	H	Maçon	"	51455852	
18	BANKOLE Charles	H	Elève	"	60479394	
19	METOGAN Christophe	H	Cultivateur	"	65710167	
20	HOUGBOGNON K. Lucien	H	Chauffeur	"	95520316	
21	KPOSSA André	H	Elève	"	65-58-85-40	
22	KPOSSA Julien	H	Cultivateur	"	51-16-81-40	



Date, le


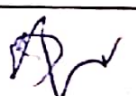


Commune de :

Arrondissement de :

Village de :

**Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

Liste de présence

N°	NOM et PRENOMS	H/F	Structure	Qualification	Adresse/ téléphone	Emargement
23	GOUSSO Séverin	H	Cultivateur		/	
24	DJAKPATA Augustin	H	Maçon		68-84-15-94	
25	DOSSA Maurice	H	Cultivateur		62-79-95-15	
26	METOGANI Gerardi	H	Cultivateur		95-72-69-75	



anteagroup

N°	NOM et PRENOMS	H/F	Qualification	structure	Adresse/ téléphone	Emargement
27	EBEZINRON Germain	H	Cultivateur	Village	97844925	MS
28	SOGNON DE Jean	H	"	"	62078508	27
29	SOGNON DE Toussaint	H	"	"	-	AVE
30	SOGNON DE Pierre	H	"	"	-	<del>AVE</del>
31	DJAKPATA Félicien	H	"	"	97394872	DAF
32	DJAKPATA Edouard	H	Electricien Batiment	"	99657292	<del>Comp</del>
33	SOGNON DE Félix	H	Cultivateur	"	-	*
34	TENON TO Joseph	H	"	"	-	①
35	DJAKPATA Pierre	H	"	"	95149601	<del>DAF</del>



anteagroup

N°	NOM et PRENOMS	H/F	Qualification	structure	Adresse/ téléphone	Emargement
36	SOGNONDE Marcellin	H	Cultivateur	Village	-	
37	SOGNONDE Mathias	H	"	"	97348261	
38	HOUNGUERE Agossou	H	"	"	-	
39	GOUDJO Didier	H	Chauffeur	"	94758007	
40	SOGNONDE Alphonse	H	Cultivateur	"	68109670	
41	BONOU Léon	H	Cultivateur	"	63-03-36-61	
42	HOUESSA Touanou	H	Cultivateur	"	/	
43	HOUESSA Samson	H	Cultivateur	"	/	
44	BANKOLE Sikirou	H	"	"	60774310	



Date, le

Commune de :  
 Arrondissement de :  
 Village de : *Djiten - Aga*

**Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

Liste de présence

N°	NOM et PRENOMS	H/F	Structure	Qualification	Adresse/ téléphone	Emargement
45	AHLONSO Lucien	H	Village	Cultivateur	51-22-05-83 6547 9569	<i>Lucien</i>
46	SOGNONDE David	H	/	Elève	95703469	<i>David</i>
47	KPOSSA Lucien	H	//	Cultivateur	/	<i>Lucien</i>
48	KPODJEOD Sylvie	F	ANTEA	Resp. Volet Social	96995300	<i>Sylvie</i>

Date, le

Commune de :

Arrondissement de :

Village de : Djiton - Aga

Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin

Liste de présence

N°	NOM et PRENOMS	H/F	Structure	Qualification	Adresse/ téléphone	Emargement
49	Tossah Isaac	H	ANTEA	Assist Resp. Volets	96062006	Afennif
50	CISSE Rahkmatoutah	F	SIPi	Resp. Enviro Social	96971717	Raj
51	MOUTANGDU Herbert	H	SIPi	Resp. Commercial	61450004	<del>SA</del>



Procès Verbal de la Consultation  
Publique de Restitution de l'EIES Internationale  
du Projet GDIZ porté par ARISE-BENIN à  
HOUEZE

11/2020

L'an 2020 et le mercredi 04 Novembre a  
eu lieu dans le village de Houéze de  
l'arrondissement de Tangbo-Djèrè, commune de  
Zè, une séance de consultation Publique de  
restitutions des résultats de l'Etude d'Impact  
Environnementale et Sociale Internationale  
de la Zone Industrielle de Glo-Djigbé.

La séance qui était prévue pour 23h a  
effectivement commencé à

Au début de la séance, après les salutations  
d'usage, la parole fut accordée au chef village  
pour ouvrir la séance, ensuite une sensibilisation  
fut faite sur les mesures barrières de  
Covid 19.

La chargée du volet sociale a ensuite  
présenté les résultats de l'EIES à partir de  
posters présentés suivi de commentaires.

La parole fut accordée aux populations  
pour énoncer leurs préoccupations et poser  
des questions.

Les questions suivantes fut posées par  
la population du village de Houéze :

1- Pourquoi avoir écarté Glo-Djigbé sur le  
projet alors que nous sommes à Tangbo-Djèrè?



2 - Souvent les personnes responsabilisées pour le recensement ne respectent pas "la priorité de la main d'œuvre locale". Ce principe est sacrifié au détriment des populations car ces personnes préfèrent recruter leurs parents, qui n'ont pas trouvé du travail et sont à la maison.

3 - Nous avons beaucoup d'apprehension par rapport à ce projet car nous n'avons appris aucun métier, c'est l'agriculture que nous avons appris à faire. Qu'allons nous devenir? Quel sera notre ~~de~~ quoi sera fait notre future, maintenant? Comment allons nous survivre?

De plus nous n'avons pas de W.C. Comment allons nous débrouiller désormais? Où allons nous faire nos besoins?

4 - Nous voulons savoir un peu plus sur le coût prévu pour notre dédommagement?

5 - Si les parents sont recrutés pour travailler sur le site du projet, le recruteur acceptera-t-il de recruter également les enfants en âge de travailler appartenant à cette même famille?



6 - Les travaux vont-ils effectivement  
démarrer maintenant? Notre souhait à  
nous population est que les travaux  
démarront au plus tôt et que nos terres  
ne nous soient pas arrachées et laissées  
en jachère comme ce qui s'est passé dans  
la zone de l'aéroport.

De même, nous souhaitons que le  
dédommagement des sinistrés se fasse au  
plus tôt.

Les réponses que nous avons apportées  
à l'ensemble de ces questions de structure  
comme suit:

- A notre avis, le nom Glo-Djigbé a été  
donné sous la logique d'un développement  
Global de la Zone de l'aéroport jusqu'à  
Allada (Zone Economique spéciale).

Il n'y a certes pas eu une étude d'acceptation  
du nom choisi par les riverains mais cela  
nous d'idée a juste échappé aux dirigeants.

Aucun ne cache aucune intention de faire  
la promotion d'une commune au détriment  
des autres qui ont plus donné en termes  
pénibilité à ce projet de développement.

- Comme les représentants du promoteur



sont également présents à cette séance, ils entendent vos craintes en ce qui concerne la priorisation de la main d'œuvre locale et en son temps veilleront à ce que tout se passe dans les normes requises.

- Nous comprenons vos appréhensions ~~est~~ c'est normal que le futur vous fait peur. Mais prenez votre mal en patience et attendez que le projet commence. Vous aurez alors des réponses qui vont certainement vous rassurer.

- Concernant les questions sur la stratégie d'expropriation et les coûts du dédommagement, votre mission n'est pas en mesure de vous répondre car nous n'avons pas l'information dans le cabinet INSUCO, qui, en ce moment travail sur le site du projet sur le Plan d'Action de Réinstallation et de Compensation (PARC) en son temps fera une séance avec vous pour vous apporter les réponses appropriées.

- Tout ce que nous pouvons vous dire sur le démarrage des travaux, c'est que visiblement le

Promoteur est pressé de commencer,  
cette séance est pour vous restituer les  
résultats de l'IEIES comme annoncé au  
départ. Il vous revient maintenant de vous  
l'approprier et de vous ouvrir à la collaboration  
avec le promoteur.

La séance a fait fin à 16h00 après les  
mots de remerciement et de satisfaction de  
l'équipe venue faire la restitution et  
le chef village.

ont signé

Zanmenou Bonou Codjo

~~MM~~  
Zansou Joachim  
Sup



AF


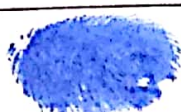


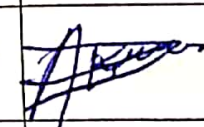
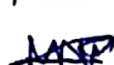
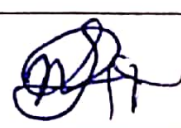
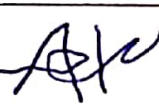
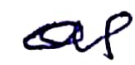


Commune de : Zê  
Arrondissement de : Tangbo-Djèrie  
Village de : Houéjè

Consultations publiques de restitution de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin



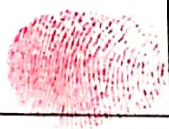
Liste de présence

N°	NOM et PRENOMS	H/F	Structure	Qualification	Adresse/ téléphone	Emargement
01	JANSDU Joachim	H	Arrond.	CV Houéjè	97843780	Sy
02	DINGNIBBET Simon	H	Mairie	C/SABE	97269834	
03	ARLONSDU Dominique	H	Village	Tailleur	64900231	
04	AVOCETIEN Marguerite	F	H	Cultivatri	-	

N°	NOM et PRENOMS	H/F	Qualification	Structure	Adresse/ téléphone	Emargement
05	KOSSOKO Séverin	H	Cultivateur	village	-	
06	ZANNOU Roger	H	"	Village	-	
07	MINDEKPO Louis	H	Conducteur	"	97510571	
08	KOUDEDO François	H	Cultivateur	"	97852642	
09	KOSSOU Patrick	H	"	"	98343800	
10	ZANMEROU BONOU Cody	H	"	"	97954844	
11	ADOUANJINDU Sylvain	H	Chauffeur	"	90384832	
12	ARLONSON Christophe	H	Cultivateur	"	97253936	
13	DELIZO Jonas	H	"	"	-	



anteagroup

N°	NOM et PRENOMS	H/F	Qualification	st	Adresse/ téléphone	Emargement
14	ZINSOU Césaire	H	Cultivateur	village	94295580	
15	HOUE NANGNON Ernest	H	"	"	-	
16	KPATENDON Yvette	F	Cont.rière	"	95761959	KyeX
17	KOUDEBO Félicien	H	Cultivateur	"	97633887	KTY
18	KPADONON Sylvain	H	Imprimeur Serigraphe	"	91778207	fyf
19	GUELIZON Bertin	H	cultivateur	"	94486642	muyp
20	ALLONSON Félix	H	"	"	62120781	Amoya
21	KOSSOU Romain	H	"	"	97759800	Amoy
22	KOSSOU Théophile	H	"	"	-	





anteagroup

N°	NOM et PRENOMS	H/F	Qualification	sk	Adresse/ téléphone	Emargement
23	VOGOUNON André	H	Cultivateur	Village	63164412	VA
24	AVOGETTEN Véronique	F	"	"	—	
25	GOVE Colette	F	Revendeuse	"	96234555	WU
26	HOUNDEGLA Christine	F	Elève	"	—	Gyde
27	GANDAHO Dorouède	F	Cultivatrice	"	—	
28	MENDU Henriette	F	"	"	—	
29	TORPANDU Félicienne	F	"	"	—	0
30	SABLOUNON Marceline	F	"	"	—	
31	TINDO Dénoukounin	F	Revendeuse	"	—	



anteagroup

N°	NOM et PRENOMS	H/F	Qualification		Adresse/ téléphone	Emargement
32	GNDONLONFOU Victorine	F	Resendense	Village	-	
33	ADANGWIKOU Louise	F	"	"	-	
34	HOUNKPE Geraldine	F	"	"	<del>524873</del> 63981873	
35	AMOUSSOU Claudine	F	Aide Soignante	"	96320731	<u>Ante</u>
36	HOUDE Jeanette	F	Resendense	"	-	
37	AZONSSI Josephine	F	Photographe	"	61251923	C&S
38	ADOMANKOU Adèle	F	Cultivatrice	"	-	
39	ADOUSSOU Mawstin	F	"	"	-	
40	AHOSSINDOU	F	"	"	-	



N°	Nom et Prénom	H/F	Structure	Quali	Tel	Logo
41	COSI A Antoinette	F	Le Village	Contoirie	99435420	Caf
42	METOWANDU Grace	F	"	Informaticienne	95605598	
43	TOSSOU Ruth	F	<del>Le Village</del>	Cultivatrice	-	
44	KOUYE Kévine	F	Village	Coiffeuse	-	72
45	AHLONSDU Sèran	F	"	"	67 155693	
46	WANNOW Catherine	F	"	Productrice de Soda	96196756	
47	AHOSSI Adèle	F	"	Coiffeuse	-	CLO
48	EDJAKPATA Fifiame	F	"	Cultivatrice	-	
49	MAHOUSSE Takli	F	"	"	-	

## **Annex XIV Summary of consultation activities in the districts of Tori-Cada and Tangbo-Djévié – ESIA disclosure consultations**

**Compte rendu de :**

**Consultations publiques de restitution des Résultats de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

**Lieu : Hotel de ville de Tori-Bossito**

**Date : 05/11/2020**

**Heure : 10h40**

Commune : **Tori - Bossito**

Arrondissement : **Tori - Cada**

Date **10/ 11 / 2020** ] Heure de début **10 h 40 mn** ] Heure de Clôture **12 h 04 mn**

Responsable de l'activité (Nom et Prénoms/Titre) : **KPODJEDO Sylvie, Chargée du volet Social**

***Personnes associées à l'activité***

<b>N° d'ordre</b>	<b>Nom et Prénoms</b>	<b>Titre</b>	<b>Structure</b>
1	KPODJEDO SYLVIE	Responsable Volet Social	ANTEA
2	TOSSAH ISAAC	Assistant Responsable Volet Social	ANTEA
3	MOUTANGOU HERBERT	Responsable Commercial	SIPI / ARISE

***Tableau récapitulatif des participants***

<b>Participants</b>	<b>EFFECTIF</b>		
	<b>H</b>	<b>F</b>	<b>TOTAL</b>
<b>ANTEA</b>	1	1	2
<b>ARISE</b>	1	0	1
<b>VILLAGE</b>	8	0	8
<b>TOTAL</b>	10	1	11

<p align="center"><b>Types de techniques utilisées</b></p> <p align="center"> <input checked="" type="checkbox"/> présentation power point    <input type="checkbox"/> Présentation Poster    <input type="checkbox"/> Questions- Réponses  <input type="checkbox"/> médias    <input type="checkbox"/> photos </p>	
<p><b>Objectif de la rencontre</b></p> <p>Présenter le projet et les résultats de l'EIES aux populations des VILLAGES impactés par le projet</p>	<p><b>Résultats attendus</b></p> <ol style="list-style-type: none"> <li>1. Le projet est mieux appréhendé par les populations</li> <li>2. Les résultats de l'EIES sont connus par les populations</li> <li>3. Les préoccupations des populations sont exprimées et les réponses apportées</li> </ol>
<p><b>Questions posées</b></p> <ol style="list-style-type: none"> <li>1. Quelles sont les zones de Tori-Bossito impactées par les différentes phases du projet ?</li> <li>2. Quelles relations lient le projet de la GDIZ avec la ZES et la ZAD ?</li> <li>3. Quelles sont les mesures de bonifications prévues pour juguler les impacts négatifs du projet ?</li> <li>4. Quelles sont les critères utilisés pour délimiter la zone de la première phase du projet ?</li> </ol>	<p><b>Résumé des réponses apportées</b></p> <p>Pour toutes les questions concernant le dédommagement, le cabinet INSUCO qui travaille en ce moment sur le terrain sur le Plan d'Action de Réinstallation et de Compensation (PARC), organisera une séance comme celle-ci à la fin de son travail et vous donnera des réponses plus appropriées à vos préoccupations sur ce volet.</p> <ul style="list-style-type: none"> <li>➤ Dans la conception du plan de la zone industrielle, l'implantation des infrastructures n'a pas tenu compte de la position des communes, mais plutôt de la carte de la zone.</li> <li>➤ La ZAD est incluse dans la zone industrielle de Glo-Djigbé et n'est qu'une partie de la ZES.</li> <li>➤ Au nombre des mesures de bonifications prévues, figure le plan de développement communautaire. Ce plan est un gros volet qui inclut les actions de développement de secteur à promouvoir.</li> <li>➤ Il faut retenir que le promoteur n'est pas dans une dynamique de développement d'une commune au détriment d'une autre. Mais dans une démarche globale et inclusive.</li> </ul>
<p><b>Quel aspect de la restitution a le plus retenu l'attention des participants ?</b></p> <ul style="list-style-type: none"> <li>➤ La répartition spatiale des infrastructures du projet;</li> </ul>	<p><b>Quel aspect de la restitution les participants ont eu le plus de difficultés à comprendre ?</b></p> <ul style="list-style-type: none"> <li>➤ La répartition des infrastructures dans les différentes communes impactées</li> </ul>

<p>➤ Les mesures de bonification du projet pour les communes.</p>	<p><b>Quel aspect de la restitution les participants ont eu du mal à croire?</b></p> <p>➤ L'effectivité de la priorisation de la main d'oeuvre locale.</p>
<p><b>Recommandations et actions à engager :</b></p> <p>➤ Equilibrer les activités du projet sur les deux communes ;</p> <p>➤ Accompagner la promotion des forêts sacrées dzans le but de booster l'écotourisme au sein de la commune</p>	





Nom des autres participants

N.	Nom Prénom	Fonction	N. de téléphone
1	AKOUAKOU Rogatien	Maire de Tori	97 44 43 54
2	AKONDE A. Cosme	PAM	97 72 21 88
3	LANTEFAN Romain	DAM	97 98 77 56
4	HOUNTONOTI M. Oscar	SG	97 99 15 01
5	AGBOZED Gérard	CA Azokoué-Ali	96 95 76 98
6	ACCROMBESSI Constant	CA Tori-Bossito	97 93 15 35
7	FAJEKON Alain	CA Tori-Cada	97 31 58 52
8	AZONNASSOU Gilbert	C/BADE	51 50 45 61

Signature

Nom du ou des responsables de l'activité

  
Sylvie KPOJEDD



Visa

Nom et titre de l'Autorité communale

  
AKOUAKOU Rogatien

**Compte rendu de :**

**Consultations publiques de restitution des Résultats de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

**Lieu : Ecole Primaire Publique de Sogbé**

**Date : 10/11/2020**

**Heure : 14h29**

Commune : **Tori - Bossito**

Arrondissement : **Tori - Cada**

VILLAGE : **Sogbé**

Date **10/ 11 / 2020** ] Heure de début **14 h 29 mn** ] Heure de Clôture **16 h 18 mn**

Responsable de l'activité (Nom et Prénoms/Titre) : **KPODJEDO Sylvie, Chargée du volet Social**

***Personnes associées à l'activité***

N° d'ordre	Nom et Prénoms	Titre	Structure
1	KPODJEDO SYLVIE	Responsable Volet Social	ANTEA
2	TOSSAH ISAAC	Assistant Responsable Volet Social	ANTEA
3	RAHKMATOULAH CISSE	Responsable Environnemental et Social	SIPI / ARISE
4	MOUTANGOU HERBERT	Responsable Commercial	SIPI / ARISE

***Tableau récapitulatif des participants***

Participants	EFFECTIF		
	H	F	TOTAL
ANTEA	1	1	2
ARISE	1	1	2
VILLAGE	31	17	48
TOTAL	33	19	52

<b>Types de techniques utilisées</b> <input checked="" type="checkbox"/> présentation power point <input type="checkbox"/> Présentation Poster <input type="checkbox"/> Questions- Réponses <input type="checkbox"/> médias <input type="checkbox"/> photos	
<b>Objectif de la rencontre</b> Présenter le projet et les résultats de l'EIES aux populations des VILLAGES impactés par le projet	<b>Résultats attendus</b> 4. Le projet est mieux appréhendé par les populations 5. Les résultats de l'EIES sont connus par les populations 6. Les préoccupations des populations sont exprimées et les réponses apportées
<b>Questions posées</b> <b>Questions posées</b> 5. Pourquoi amener vous un projet qui représente un véritable sabotage pour notre vie? Un perturbateur de notre quiétude quotidienne ? 6. Pourquoi le même état qui en nous arrachant nos terres dans la zone de l'aéroport arbitrairement, et qui nous avait demandé de nous réfugier ici sur le reste de nos terres, veut-il nous chasser encore d'ici ? où irions nous ? nous ne sommes pas preneurs de ce projet ! 7. L'Etat veut-il notre mort? autant qu'il nous tue tous et nous enterre dans une fosse commune ainsi il pourra réaliser son projet 8. L'Etat est certes propriétaire des terres mais pourquoi mène-t-il une politique pour nous asphyxier ? autant qu'il nous tue tout de suite ! 9. Nous entendons à la radio, les montants fixés pour le dédommagement des terres de la ZES qui ne ressemblent en rien à la valeur réelle que nous nous lui attribuons. Nous ne sommes pas intéressés ! 10. Quel que soit le montant du dédommagement pensez-vous que ça pourra durer sur nous ? nous n'en voulons pas d'ailleurs ! laissez-nous juste nos terres !	<b>Résumé des réponses apportées</b> Pour toutes les questions concernant le dédommagement, le cabinet INSUCO qui travaille en ce moment sur le terrain sur le Plan d'Action de Réinstallation et de Compensation (PARC), organisera une séance comme celle-ci à la fin de son travail et vous donnera des réponses plus appropriées à vos préoccupations sur ce volet. ➤ Nous percevons beaucoup de frustration quand vous prenez la parole, un rejet complet du projet qui n'a pas évolué depuis le début de nos rencontres avec vous dans le cadre de ce projet. Vous être complètement désabusés et ne croyez même plus en tout ce que nous vous avons présenté comme impact positifs et mesures de bonification et d'atténuation. Nous comprenons que ce que vous avez subi dans le cadre de l'expropriation dans la zone de l'aéroport vous a laissée un goût très amer. Malheureusement nous, nous ne pouvons rien par rapport à cette réalité qui vous a marquée. Mais par rapport au projet qui nous amène, nous vous disons tout simplement d'attendre que ça commence et vous verrai par vous-même la différence dans votre traitement. Le promoteur a une approche différente des choses et voudrait que nous vous l'expliquons. S'il a pris soin de faire les études nécessaires avec fort accent sur les normes internationales, c'est déjà une preuve de sa bonne volonté à traiter le social différemment. ➤ Dans les mesures figure en bonne place la prise en compte des femmes et des groupes vulnérables

<p>11. Pensez vous que nous, héritiers, avons de l'argent pour faire les démarches officielles de propriété de parcelle ?</p> <p>12. Pourquoi le présent président veut il mettre fin à l'agriculture ? c'est pourtant un digne président du Bénin, le Président AKPITY qui nous a encouragé à nous lancer résolument dans cette activité et la terre ne nous a jamais mentie !</p> <p>13. Pourquoi voulez vous arracher les terres de nos Maris ? ou irons-nous ? laisser leur terre pour leur survie et celle de leur famille</p> <p>14. Qu'est –ce qui garantit que le recrutement de la main d'oeuvre se fera avec priorité au niveau local et que comme ça se passe souvent ailleurs; les recruteurs n'auront-ils pas tendance à prioriser leurs enfants et parents qui chôment et qui sont à la maison</p> <p>15. Que deviendront ceux qui ne savent rien faire d'autres que les travaux champêtres et de surcroit ne savent ni lire et écrire? Pourront ils survivre avec ce projet? De quoi sera fait notre venir? Comment allons nous vivre? Quel genre de travail on pourrait donner à un non lettré sur le site? Ne va t'on pas nous exiger des diplômes?</p> <p>16. Dites nous toujours de quell types de formations nos enfants auraient besoins pour être recruter sur le site du projet pour que nous puissions dès maintenant les y orienter ?</p> <p>17. Quel sera le coût de notre dédommagement? Est- ce que le coût du dédommagement sera proportionnel à la valeur des terres qui nous sont arrachées? Où allons nous trouver d'autres terres?</p>	<ul style="list-style-type: none"> <li>➤ Nous comprenons vos apprehensions, mais le present projet va se faire suivant non seulement les normes nationales mais également suivant les normes internatioanles. Essayer de prendre votre mal en patience et attendez que les travaux commencent.</li> <li>➤ Le Personnel Arise présent à cette seéce, note également cette preoccupation que vous avez.</li> <li>➤ Le cabinet INSUCO en son temps répondra à cette question</li> <li>➤ De façon générale, notre mission à nous pour cette rencontre est de vous restituer les résultats de l'EIES internationale de la zone industrielle de Glo-Djigbé afin que vous vous l'appropriiez.</li> <li>➤ La logique qui gouverne ce projet, à notre avis, n'est pas celle de faire mal aux population, mais une logique de développement. Et le promoteur souhaite travailler avec vous dans la collaboration. Il serait vraiment plus profitable pour vous que vous laissez tombez votre colère et vous ouvrez à la collaboration car dans la colère vous ne pourrez pas vous faire entendre et défendre vos intérêts.</li> </ul>
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18. Les terres arrachées dans la zone de l'aéroport, elles sont toujours en jachères, pourquoi votre projet ne se ferait il pas sur ces terres ?	
<b>Quel aspect de la restitution a le plus retenu l'attention des participants ?</b> <ul style="list-style-type: none"> <li>➤ L'expropriation</li> </ul>	<b>Quel aspect de la restitution les participants ont eu le plus de difficultés à comprendre ?</b> <ul style="list-style-type: none"> <li>➤ Le dédommagement dans des conditions plus améliorées que celles de la zone de l'aéroport</li> </ul> <b>Quel aspect de la restitution les participants ont eu du mal à croire?</b> <ul style="list-style-type: none"> <li>➤ L'effectivité de la priorisation de la main d'oeuvre locale.</li> </ul>
<b>Recommandations et actions à engager :</b> <ul style="list-style-type: none"> <li>➤ Que l'état identifie des terres disponibles pour la réinstallation de tous les sinistrés et leur famille !</li> </ul>	






nom des autres participants

N.	Nom Prénom	Fonction	N. de téléphone
1	ALLOU Adrien	chef village	97 18 85 54
2	KANMA Gorgore	Tailleur	-
3	KINNAN Comlan	Cultivateur	69 12 10 25
4	DGO Dieudonné	"	97 46 81 84
5	ZOUNDE Léopold	"	67 14 53 64
6	DANGBENON Victorin	Commerçant	97 22 61 82
7	MONDE Félix	chauffeur	96 60 04 55
8	ALOU Delphin	Cultivateur	51 03 40 65
9	Lakouon Séverin	"	96 21 28 25
10	ALOU Félicien	"	-

Signature

Nom du ou des responsables de l'activité

  
KPODJE D Sylvie

Visa

Nom et titre de l'Autorité villageoise ( CV)

  
ALLOU Adrien



**Compte rendu de :**

**Consultations publiques de restitution des Résultats de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

**Lieu : Place Publique**

**Date : 10/11/2020**

**Heure : 16h50**

Commune : **Tori - Bossito**

Arrondissement : **Tori - Cada**

VILLAGE : **Gbéta-Aga**

Date **10 / 11 / 2020** ] Heure de début **16 h 50 mn** ] Heure de Clôture **17 h 45 mn**

Responsable de l'activité (Nom et Prénoms/Titre) : **KPODJEDO Sylvie, Chargée du volet Social**

***Personnes associées à l'activité***

<b>N° d'ordre</b>	<b>Nom et Prénoms</b>	<b>Titre</b>	<b>Structure</b>
1	KPODJEDO SYLVIE	Responsable Volet Social	ANTEA
2	TOSSAH ISAAC	Assistant Responsable Volet Social	ANTEA
3	RAHKMATOULAH CISSE	Responsable Environnemental et Social	SIPI / ARISE
4	MOUTANGOU HERBERT	Responsable Commercial	SIPI / ARISE

***Tableau récapitulatif des participants***

<b>Participants</b>	<b>EFFECTIF</b>		
	<b>H</b>	<b>F</b>	<b>TOTAL</b>
<b>ANTEA</b>	1	1	2
<b>ARISE</b>	1	1	2
<b>VILLAGE</b>	18	23	41
<b>TOTAL</b>	20	25	45

Types de techniques utilisées	
<input checked="" type="checkbox"/> présentation power point <input type="checkbox"/> Présentation Poster <input type="checkbox"/> Questions- Réponses <input type="checkbox"/> médias <input type="checkbox"/> photos	
<b>Objectif de la rencontre</b> 1- Présenter le projet et les résultats de l'EIES aux populations des VILLAGES impactés par le projet	<b>Résultats attendus</b> 1- Le projet est mieux appréhendé par les populations 2- Les résultats de l'EIES sont connus par les populations 3- Les préoccupations des populations sont exprimées et les réponses apportées
<b>Questions posées</b> <b>Questions posées</b>  1- Comment exproprie t'on les propriétaires terriens ? quelles sont les stratégies mise en place ?  2- Qu'est –ce qui garantit que le recrutement de la main d'oeuvre se fera avec priorité au niveau local et que comme ça se passe souvent ailleurs; les recruteurs n'auront-ils pas tendance à prioriser leurs enfants et parents qui chôment et qui sont à la maison  3- Que deviendront ceux qui ne savent rien faire d'autres que les travaux champêtres et de surcroit ne savent ni lire et écrire? Pourront ils survivre avec ce projet? De quoi sera fait notre venir? Comment allons nous vivre? Quel genre de travail on pourrait donner à un non lettré sur le site? Ne va t'on pas nous exiger des diplômes?  4- L'Etat certes est chef des terres, nous le savons. Mais comment cela va-t-il se passer ? Nous exproprie t'on pour de bon ? pourrons nous à la fin des trois phases du projet revenir sur nos terres ?	<b>Réponses apportées</b> ➤ Pour toutes les questions sur l'expropriation, le dédommagement vous aurez vos réponses avec le Cabinet INSUCO qui travaille en ce moment sur le terrain sur le Plan d'Action de Réinstallation et de Compensation (PARC). Quand il finira ses travaux, il aura une séance semblable avec vous et donnera réponses à vos préoccupations.  ➤ Nous comprenons vos appréhensions, mais le présent projet va se faire suivant non seulement les normes nationales mais également suivant les normes internationales. Essayer de prendre votre mal en patience et attendez que les travaux commencent.  ➤ Le Personnel Arise présent à cette séance, note également cette préoccupation que vous avez. ➤ Le cabinet INSUCO en son temps répondra à cette question  ➤ Vous ne pourrez plus revenir sur vos terres car au bout des trois phases, il n'y aura plus de terre disponible pour vous mais en lieu et place, il aura les infrastructures que je vous ai montrées en image lors de ma présentation. Donc oui, l'expropriation est pour de bon et avant que les

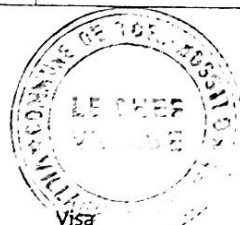
<p>5- Quel sera le coût de notre dédommagement? Est- ce que le coût du dédommagement sera proportionnel à la valeur des terres qui nous sont arrachées? va t'on nous trouver d'autres terres?</p> <p>6- L'expropriation concerne t'elle les champs aussi bien que les maisons ?</p> <p>7- Etant donné que les travaux n'ont pas encore commencé, si nous sommes en besoin urgent d'argent, pourrions nous vendre nos terres qui se situent sur le site ?</p>	<p>travaux ne commencent, vous serez d'abord dédommagés.</p> <ul style="list-style-type: none"> <li>➤ L'expropriation concerne surtout les champs. Cependant les hameaux qui sont dans les champs et quelques maisons isolées subiront aussi l'expropriation</li> <li>➤ Non vous ne pouvez plus vendre ces terres. A partir du moment où la Déclaration d'Utilité Publique est sortie, vous n'avez plus le droit de vendre ces terres. Prenez votre mal en patience et attendez que la procédure suit son cours jusqu' à votre dédommagement.</li> </ul>
<p><b>Quel aspect de la restitution a le plus retenu l'attention des participants ?</b></p> <ul style="list-style-type: none"> <li>➤ Le dédommagement</li> <li>➤ Le recrutement de la main d'oeuvre locale</li> </ul>	<p><b>Quel aspect de la restitution les participants ont eu le plus de difficultés à comprendre ?</b></p> <ul style="list-style-type: none"> <li>➤ L'expropriation</li> </ul> <p><b>Quel aspect de la restitution les participants ont eu du mal à croire?</b></p> <ul style="list-style-type: none"> <li>➤ L'effectivité de la priorisation de la main d'oeuvre locale.</li> </ul>
<p><b>Recommandations et actions à engager :</b></p> <ul style="list-style-type: none"> <li>➤ Que nous soyons dédommagés effectivement avant le début des travaux.</li> <li>➤ Qu'on ne nous oppose pas les diplômes pour nous recruter</li> </ul>	



Nom des autres participants

N.	Nom Prénom	Fonction	N. de téléphone
1	ANDCETIEN Séraphin	Chef Village	97458553
2	TANTINON Jacques	Vulgarisateur	91640263
3	KOUTON Florentin	Cultivateur	97380682
4	TOGBE Germane	Brigadier	68217359
5	HEMAHO Victor	Cultivateur	91324541
6	GBENANGNON Nicolas	"	97861329
7	LALI Paul	"	-
8	KOUTON Simon	Chauffeur	-
9	KINTCHOU Lucien	Cultivateur	-
10	AGBIN Mathieu	"	-

Signature



Nom du ou des responsables de l'activité

Nom et titre de l'Autorité villageoise ( CV)

KPOJED Sylvie

AVE CETIEN Séraphin



**Compte rendu de :**

**Consultations publiques de restitution des Résultats de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

**Lieu : Place Publique**

**Date : 12/11/20**

**Heure : 14h20**

Commune : **Tori - Bossito**

Arrondissement : **Tori - Cada**

VILLAGE : **Dokanmè**

Date **12 / 11 / 2020** ] Heure de début **14 h 20 mn** ] Heure de Clôture **15 h 35 mn**

Responsable de l'activité (Nom et Prénoms/Titre) : **KPODJEDO Sylvie, Chargée du volet Social**

***Personnes associées à l'activité***

N° d'ordre	Nom et Prénoms	Titre	Structure
1	KPODJEDO SYLVIE	Responsable Volet Social	ANTEA
2	TOSSAH ISAAC	Assistant Responsable Volet Social	ANTEA
3	RAHKMATOULAH CISSE	Responsable Environnemental et Social	SIPI / ARISE
4	MOUTANGOU HERBERT	Responsable Commercial	SIPI / ARISE

***Tableau récapitulatif des participants***

Participants	EFFECTIF		
	H	F	TOTAL
ANTEA	1	1	2
ARISE	1	1	2
VILLAGE	39	11	50
TOTAL	41	13	54

Types de techniques utilisées	
<input checked="" type="checkbox"/> présentation power point <input type="checkbox"/> Présentation Poster <input type="checkbox"/> Questions- Réponses <input type="checkbox"/> médias <input type="checkbox"/> photos	
<b>Objectif de la rencontre</b> 2- Présenter le projet et les résultats de l'EIES aux populations des VILLAGES impactés par le projet	<b>Résultats attendus</b> 1- Le projet est mieux appréhendé par les populations 2- Les résultats de l'EIES sont connus par les populations 3- Les préoccupations des populations sont exprimées et les réponses apportées
<b>Questions posées</b> <b>Questions posées</b> 1- Vous avez dit que les travaux se dérouleront en trois phases, quelle est la délimitation par phase?  2- Comment se fera le dédommagement?   3- Qu'est –ce qui garantit que le recrutement de la main d'oeuvre se fera avec priorité au niveau local et que comme ça se passe souvent ailleurs; les recruteurs n'auront-ils pas tendance à prioriser leurs enfants et parents qui chôment et qui sont à la maison  4- Que deviendront ceux qui ne savent rien faire d'autres que les travaux champêtres et de surcroit ne savent ni lire et écrire? Pourront ils survivre avec ce projet? Quel genre de travail on pourrait donner à un non lettré sur le site? Ne va t'on pas nous exiger des diplômes?  5- Où se situe Dokanmè sur votre plan ? montrer nous ça?	<b>Réponses apportées</b> ➤ Revue du poster de la carte de délimitation pour l'explication souhaitée  ➤ Pour toutes les questions sur le dédommagement vous aurez vos réponses avec le Cabinet INSUCO qui travaille en ce moment sur le terrain sur le Plan d'Action de Réinstallation et de Compensation (PARC). Quand il finira ses travaux, il aura une séance semblable avec vous et donnera réponses à vos préoccupations.  ➤ Vos craintes sont justes. Et vous faites bien de les formuler. Comme les représentant du promoteur sont avec nous, ils prennent bonne note et en sont temps y veilleront.  ➤ Nous comprenons vos appréhensions, mais le present projet va se faire suivant non seulement les normes nationales mais également suivant les normes internationales. Essayer de prendre votre mal en patience et attendez que les travaux commencent.  ➤ Réponse montrée sur la carte

<p>6- Vous avez parlé de priorisation de la main d'œuvre locale, là où les travaux ont déjà commencé, combien de personnes ont été déjà recruté?</p>	<p>➤ Les travaux n'ont pas encore commencé. Certe le cabinet INSUCO est en ce moment en train de faire le recensement des sinistrés dans le périmètre des 400ha de la première phase du projet, mais ça n'a rien à voir avec le démarrage des travaux.</p>
<p><b>Quel aspect de la restitution a le plus retenu l'attention des participants ?</b></p> <p>➤ Le coût du dédommagement</p> <p>➤ Le recrutement de la main d'oeuvre locale</p>	<p><b>Quel aspect de la restitution les participants ont eu le plus de difficultés à comprendre ?</b></p> <p>➤ Le dédommagement juste et équitable</p> <p><b>Quel aspect de la restitution les participants ont eu du mal à croire?</b></p> <p>➤ L'effectivité de la priorisation de la main d'oeuvre locale.</p>
<p><b>Recommandations et actions à engager :</b></p> <p>➤ Qu'on ne nous oppose pas les diplômes pour nous recruter</p>	



Nom des autres participants

N.	Nom Prénom	Fonction	N. de téléphone
1	ODOU Marcellin	chef Village	66 28 67 51
2	GANGBENDON David	Cultivateur	-
3	AHOLOU Abel	Soudeur	66 04 05 87
4	DISSOU Pacôme	Chauffeur	97 53 75 51
5	KOROTSEKOU Sylvain	Généraliste Trd	97 72 34 74
6	DISSOU Anatole	Chauffeur	66 48 01 96
7	KODO Barnabé	"	97 37 57 33
8	APIEH Augustin	Cultivateur	91 78 16 25
9	NOUMNHI Denise	Revendeuse	-
10	KINDJINDOU Alphonse	Cultivatrice	-


Signature



Nom du ou des responsables de l'activité

Nom et titre de l'Autorité villageoise ( CV)

  
KPOJEDD Sylvie

  
ODOU Marcellin

**Compte rendu de :**

**Consultations publiques de restitution des Résultats de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

**Lieu :** Ecole primaire publique

**Date :** 11/11/2020

**Heure :** 16h15

Commune : **Tori - Bossito**

Arrondissement : **Tori - Cada**

VILLAGE : **Zèbè**

Date **11 / 11 / 2020** ] Heure de début **16 h 15 mn** ] Heure de Clôture **17 h 45 mn**

Responsable de l'activité (Nom et Prénoms/Titre) : **KPODJEDO Sylvie, Chargée du volet Social**

***Personnes associées à l'activité***

N° d'ordre	Nom et Prénoms	Titre	Structure
1	KPODJEDO SYLVIE	Responsable Volet Social	ANTEA
2	TOSSAH ISAAC	Assistant Responsable Volet Social	ANTEA
3	RAHKMATOULAH CISSE	Responsable Environnemental et Social	SIPI / ARISE
4	MOUTANGOU HERBERT	Responsable Commercial	SIPI / ARISE

***Tableau récapitulatif des participants***

Participants	EFFECTIF		
	H	F	TOTAL
<b>ANTEA</b>	1	1	2
<b>ARISE</b>	1	1	2
<b>VILLAGE</b>	43	2	45
<b>TOTAL</b>	45	4	49



Types de techniques utilisées	
<input checked="" type="checkbox"/> présentation power point <input type="checkbox"/> Présentation Poster <input type="checkbox"/> Questions- Réponses <input type="checkbox"/> médias <input type="checkbox"/> photos	
<b>Objectif de la rencontre</b> 3- Présenter le projet et les résultats de l'EIES aux populations des VILLAGES impactés par le projet	<b>Résultats attendus</b> 7- Le projet est mieux appréhendé par les populations 8- Les résultats de l'EIES sont connus par les populations 9- Les préoccupations des populations sont exprimées et les réponses apportées
<b>Questions posées</b> <b>Questions posées</b> 1- Comment va se passer l'expropriation des terres où nous avons inhumé nos parents?  2- Quel sera le coût de notre dédommagement? Est-ce que le coût du dédommagement sera proportionnel à la valeur des terres qui nous sont arrachées? va-t-on nous trouver d'autres terres? Va-t-on nous dédommager avant le début des travaux ?  3- Ceux qui ont des terres ici sans plaque identifiant et ne sont pas au pays donc ne savent pas qu'il y a expropriation, comment ça va se passer pour eux?  4- Comment s'assurer que le promoteur va respecter ses engagements sur la priorisation de la main d'œuvre locale ?  5- Etes vous la même équipe que l'IGN qui est venue ici, il y a 3 mois pour des délimitations et qui nous a dit que dans 3ans le projet viendrait dans notre localité ?  6- La pollution nocif que va engendrer ce projet pour les riverain, qui prendra en charge leur soins en son temps ?	<b>Réponses apportées</b> ➤ Pour toutes les questions sur le dédommagement vous aurez vos réponses avec le Cabinet INSUCO qui travaille en ce moment sur le terrain sur le Plan d'Action de Réinstallation et de Compensation (PARC). Quand il finira ses travaux, il aura une séance semblable avec vous et donnera réponses à vos préoccupations.  ➤ Vos craintes sont justes. Et vous faites bien de les formuler. Comme les représentant du promoteur sont avec nous, ils prennent bonne note et en sont temps y veilleront.  ➤ Nous comprenons vos appréhensions, mais le present projet va se faire suivant non seulement les normes nationales mais également suivant les normes internationales. Essayer de prendre votre mal en patience et attendez que les travaux commencent.  ➤ Notre étude a en prelude à la pollution, recommandée que ldes mesures soient prises. De plus le promoteur à prevue des centre de traitement des eaux usées, des déchets et autres pour réduire aux maximum les effets de pollution.

<p>7- Quand est ce que les travaux vont réellement commencer ? nous voulons savoir pour nous apprêter.</p> <p>8- Qu'est –ce qui garantit que le recrutement de la main d'oeuvre se fera avec priorité au niveau local et que comme ça se passe souvent ailleurs; les recruteurs n'auront-ils pas tendance à prioriser leurs enfants et parents qui chôment et qui sont à la maison</p> <p>9- Que deviendront ceux qui ne savent rien faire d'autres que les travaux champêtres et de surcroit ne savent ni lire et écrire? Pourront ils survivre avec ce projet? De quoi sera fait notre venir? Comment allons nous vivre? Quel genre de travail on pourrait donner à un non lettré sur le site? Ne va t'on pas nous exiger des diplômes?</p>	
<p><b>Quel aspect de la restitution a le plus retenu l'attention des participants ?</b></p> <ul style="list-style-type: none"> <li>➤ Le coût du dédommagement</li> <li>➤ Le recrutement de la main d'oeuvre locale</li> </ul>	<p><b>Quel aspect de la restitution les participants ont eu le plus de difficultés à comprendre ?</b></p> <ul style="list-style-type: none"> <li>➤ Cout juste et equitable du dédommagement</li> </ul> <p><b>Quel aspect de la restitution les participants ont eu du mal à croire?</b></p> <ul style="list-style-type: none"> <li>➤ L'effectivité de la priorisation de la main d'oeuvre locale.</li> </ul>
<p><b>Recommandations et actions à engager :</b></p> <ul style="list-style-type: none"> <li>➤ Qu'on ne nous oppose pas les diplômes pour nous recruter</li> </ul>	

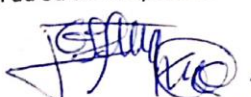


des autres participants

N.	Nom Prénom	Fonction	N. de téléphone
1	ADJIHANOU K. Blaise	Chef Village	96225750
2	AYOCETIEN Martin	Cultivateur	9723 9973
3	SOGBONOU Daniel	Photographe	97059472
4	SESSOU A. Clément	Sondeur	95405178
5	BOGLO Julien	Maçon	96007569
6	AGBIN Eric	Cultivateur	97719134
7	GBEGBEDJI Simplice	11	97642662
8	SINHOUCOOR	Pasteur	97217469
9	AYOCETIEN Germain	Chauffeur	97687266
10	ABDLOU Claude	Cultivateur	97599987

Signature

Nom du ou des responsables de l'activité

  
KPOJESD Sylvie

Visa  
Nom et titre de l'Autorité communale

  
ADJIHANOU KOFFI  
Blaise

**Compte rendu de :**

**Consultations publiques de restitution des Résultats de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

**Lieu : Hôtel de ville de Zè**

**Date : 03/11/2020**

**Heure : 16h10**

Commune : **Zè** Arrondissement : **Tangbo-Djèvié**

Date **03 / 11 / 2020** ] Heure de début **16 h 10 mn** ] Heure de Clôture **17 h 30 mn**

Responsable de l'activité (Nom et Prénoms/Titre) : **KPODJEDO Sylvie, Chargée du volet Social**

***Personnes associées à l'activité***

N° d'ordre	Nom et Prénoms	Titre	Structure
1	KPODJEDO SYLVIE	Responsable Volet Social	ANTEA
2	TOSSAH ISAAC	Assistant Responsable Volet Social	ANTEA
3	RAHKMATOULAH CISSE	Responsable Environnemental et Social	SIPI / ARISE
4	MOUTANGOU HERBERT	Responsable Commercial	SIPI / ARISE

***Tableau récapitulatif des participants***

Participants	EFFECTIF		
	H	F	TOTAL
ANTEA	1	1	2
ARISE	1	1	2
MAIRIE	7	2	9
TOTAL	9	4	13



Types de techniques utilisées	
<input checked="" type="checkbox"/> présentation power point <input type="checkbox"/> Présentation Poster <input type="checkbox"/> Questions- Réponses <input type="checkbox"/> médias <input type="checkbox"/> photos	
<b>Objectif de la rencontre</b> 1- Présenter le projet et les résultats de l'EIES aux populations des VILLAGEs impactés par le projet	<b>Résultats attendus</b> 2- Le projet est mieux appréhendé par les populations 3- Les résultats de l'EIES sont connus par les populations 4- Les préoccupations des populations sont exprimées et les réponses apportées
<b>Questions posées</b> 1- Quelles relations existe-t-il entre la zone économique spéciale qui couvre environ 10 000 ha et zone industrielle qui couvre 1 600ha ? 2- Que gagne l'Etat Béninois dans son partenariat avec OLAM / ARISE ? Serait-ce juste des redevances pour les Béninois ? 3- Dans le processus d'expropriation, le projet pourrait-il trouver un endroit pour reloger les riverains affectés ? Si c'est le cas, il vaut mieux qu'il pense à un même espace pour conserver le noyau culturel villageois. 4- Le dédommagement se fera à quel coût ? Nous avons besoin de savoir. 5- L'ananas pain de sucre, le label Béninois se situe dans cette zone, si cette zone est prise comme zone économique, ceci équivaut à enterrer définitivement la filière et c'est la faim pour les populations. En est-on bien conscient ?	<b>Réponses apportées</b> ➤ La zone industrielle se retrouve dans la zone économique qui s'étend elle jusqu'à Allada et est constituée de 3 zones. ➤ L'Etat gagnera l'existence d'une zone industrielle qui va surement apporter des devises et générer des emplois à la population Béninoise ➤ L'expropriation concerne plus les champs que les habitations et donc le problème de préservation du noyau villageois et tissu social ne se pose pas. ➤ Pour toutes les questions sur le dédommagement vous aurez vos réponses avec le Cabinet INSUCO qui travaille en ce moment sur le terrain sur le Plan d'Action de Réinstallation et de Compensation (PARC). Quand il finira ses travaux, il aura une séance semblable avec vous et donnera réponses à vos préoccupations. ➤ La perte de la variété de l'ananas "pain de sucre" est le sacrifice que doit consentir les Béninois pour la mise en place de ce projet.

<p>6- Il y a actuellement une difficulté de gestion des dossiers de la zone prioritaire pour le dédommagement ; qu'est-ce qu'il faut faire ?</p> <p>7- Dans le processus d'expropriation il faut reconstituer les villages pour préserver le tissu social et culturel.</p>	<p>➤ Rapprochez-vous de votre Cv qui est dans le comité de dédommagement pour en apprendre davantage sur cette préoccupation. De même la chargée du volet environnemental et social, présente ici à cette rencontre enregistre cette préoccupation et en son temps vous aurez la réponse.</p>
<p><b>Quel aspect de la restitution a le plus retenu l'attention des participants ?</b></p> <ul style="list-style-type: none"> <li>➤ Le coût du dédommagement</li> <li>➤ Le recrutement de la main d'œuvre locale</li> </ul>	<p><b>Quel aspect de la restitution les participants ont eu le plus de difficultés à comprendre ?</b></p> <p><b>Quel aspect de la restitution les participants ont eu du mal à croire?</b></p> <ul style="list-style-type: none"> <li>➤ L'effectivité de la priorisation de la main d'œuvre locale.</li> </ul>
<p><b>Recommandations et actions à engager :</b></p> <ul style="list-style-type: none"> <li>➤ Nous souhaiterions qu'on ne nous oppose pas les diplômes pour nous recruter</li> <li>➤ Nous souhaiterions qu'on ne nous expulse pas un jour de notre VILLAGE du fait de la proximité de la zone industrielle de notre VILLAGE.</li> </ul>	




Nom des autres participants

N.	Nom Prénom	Fonction	N. de téléphone
1	AMADE Moussa	Maire de Zè	62006868
2	HOUEDENDU Bernard	2 <sup>ème</sup> adjoint Maire	98199482
3	HOUNKATIN Gilbert	SG Mairie	66519255
4	AVOSSE Wilfried	C/SAC	97349318
5	AMMO A. Agathe	C/CCMP	95237879
6	DINGNIGREDE Simon	C/SADE	97269834
7	ASSOJEKO Faustin	R/CATangbo-Zè	97258428
8	ABIONA D. L. Estelle	C/SDLP	96447750
9	DAGA Juliette	C/SAG	97063686


Signature

Nom du ou des responsables de l'activité

  
Sylvie KPOJEDD  
 Responsable volet  
 Social.

Visa

Nom et titre de l'Autorité communale

  
AMADE MOUSSA  
 Maire

**Compte rendu de :**

**Consultations publiques de restitution des Résultats de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

**Lieu :** ZÈ

**Date :** 04/11/2020

**Heure :** 13h50

Commune : **Zè**

Arrondissement : **Tangbo-Djèvié**

VILLAGE : **Houézè**

Date **04/11/ 2020** ] Heure de début **13 h 50 mn** ] Heure de Clôture **16 h 00 mn**

Responsable de l'activité (Nom et Prénoms/Titre) : **KPODJEDO Sylvie, Chargée du volet Social**

***Personnes associées à l'activité***

N° d'ordre	Nom et Prénoms	Titre	Structure
1	KPODJEDO SYLVIE	Responsable Volet Social	ANTEA
2	TOSSAH ISAAC	Assistant Responsable Volet Social	ANTEA
3	RAHKMATOULAH CISSE	Responsable Environnemental et Social	SIPI / ARISE
4	MOUTANGOU HERBERT	Responsable Commercial	SIPI / ARISE

***Tableau récapitulatif des participants***

Participants	EFFECTIF		
	H	F	TOTAL
<b>ANTEA</b>	1	1	2
<b>ARISE</b>	1	1	2
<b>VILLAGE</b>	21	28	49
<b>TOTAL</b>	23	30	53

Types de techniques utilisées	
<input checked="" type="checkbox"/> présentation power point <input type="checkbox"/> Présentation Poster <input type="checkbox"/> Questions- Réponses <input type="checkbox"/> médias <input type="checkbox"/> photos	
<b>Objectif de la rencontre</b> Présenter le projet et les résultats de l'EIES aux populations des VILLAGES impactés par le projet	<b>Résultats attendus</b> 1- Le projet est mieux appréhendé par les populations 2- Les résultats de l'EIES sont connus par les populations 3- Les préoccupations des populations sont exprimées et les réponses apportées
<b>Questions posées</b> 1- Pourquoi le projet porte le nom de Glo- Djigbé alors qu'il couvre uniquement les périmètres de Zè et de de Tori- Bossito?  2- Qu'est-ce qui garantit que le recrutement de la main d'œuvre se fera avec priorité au niveau local et que comme ça se passe souvent ailleurs; les recruteurs n'auront-ils pas tendance à prioriser leurs enfants et parents qui chôment et qui sont à la maison  3- Que deviendront ceux qui ne savent rien faire d'autres que les travaux champêtres et de surcroit ne savent ni lire et écrire? Pourront-ils survivre avec ce projet? De quoi sera notre venir?  4- Où allons-nous désormais faire nos besoins car nous n'avons pas de toilettes?  5- Quel sera le coût de notre dédommagement?  6- Peut-on recruter à la fois les parents et les enfants d'une même famille sur le site?	<b>Réponses apportées</b> ➤ Le nom Glo- Djigbé est donné dans une logique de développement global de la zone de l'aéroport et de la Zone Economique Spéciale (ZES) qui s'étend jusqu'à Allada et inclut donc la zone Industrielle. A notre avis, cette logique ne cache aucune intention de faire la promotion d'une commune au détriment de celles qui ont effectivement subies une expropriation.  ➤ Vos craintes sont justes. Et vous faites bien de les formuler. Comme les représentant du promoteur sont avec nous, ils prennent bonne note et en son temps y veilleront.  ➤ Nous comprenons vos appréhensions, mais le présent projet va se faire suivant non seulement les normes nationales mais également suivant les normes internationales. Essayer de prendre votre mal en patience et attendez que les travaux commencent.  ➤ Le Personnel Arise présent à cette séance, note également cette préoccupation que vous avez.  ➤ Pour toutes les questions sur le dédommagement vous aurez vos réponses avec le Cabinet INSUCO qui travaille en ce moment sur le terrain sur le Plan d'Action de Réinstallation et de Compensation (PARC). Quand il finira ses travaux, il aura une séance semblable avec vous et donnera réponses à vos préoccupations.



	<ul style="list-style-type: none"> <li>➤ Si les enfants sont en âge de travailler et recherchent un employé et qui plus est ils ont des compétences, pourquoi pas?</li> </ul>
<b>Quel aspect de la restitution a le plus retenu l'attention des participants ?</b> <ul style="list-style-type: none"> <li>➤ La priorisation du recrutement de la main d'œuvre locale</li> <li>➤ Le coût du dédommagement</li> </ul>	<b>Quel aspect de la restitution les participants ont eu le plus de difficultés à comprendre?</b> <ul style="list-style-type: none"> <li>➤ Le Nom porté par le projet ; Glo- Djigbé alors qu'il se situe sur le périmètre des communes de Zè et de Tori- Bossito</li> </ul> <b>Quel aspect de la restitution les participants ont eu du mal à croire?</b> <ul style="list-style-type: none"> <li>➤ L'effectivité de la priorisation de la main d'œuvre locale.</li> </ul>
<b>Recommandations et actions à engager :</b> <ul style="list-style-type: none"> <li>- Que les terres ne soient pas arrachées et laissées en jachère comme dans la zone de l'aéroport!</li> <li>- Que tous les sinistrés soient dédommagés avant que le projet ne commence ses travaux.</li> </ul>	



Nom des autres participants


N.	Nom Prénom	Fonction	N. de téléphone
1	DANSON Joachim	chef village	97843780
2	DINGNIGBEDE Simon	C/SADE	97269834
3	AHLONSDU Dominique	Tailleur	64 9002 31
4	AVOCETIEN Marguerite	Cultivatrice	-
5	KOSSOU Séverin	"	-
6	ZANNOU Roger	"	-
7	MINDERPO Louis	Conducteur	97510571
8	KOUDEDO François	Cultivateur	97852642
9	KOSSOU Patrick	"	96343600
10	ZANMENDU B. Cadyo	"	97954844

Signature

Nom du ou des responsables de l'activité

  
Sylvie KPOSTEDD

Visa  
 Nom et titre de l'Autorité villageoise (CV)

  
DANSON Joachim



**Compte rendu de :**

**Consultations publiques de restitution des Résultats de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

**Lieu :** Cours de l'école de Djitin-Aga

**Date :** 04/11/2020

**Heure :** 16h30

Commune : **Zè**

Arrondissement : **Tangbo-Djèvié**

VILLAGE : **Djitin -Aga**

Date **04 / 11 / 2020** ]

Heure de début **16 h 30 mn** ]

Heure de Clôture **18 h 00 mn**

Responsable de l'activité (Nom et Prénoms/Titre) : **KPODJEDO Sylvie, Chargée du volet Social**

***Personnes associées à l'activité***

N° d'ordre	Nom et Prénoms	Titre	Structure
1	KPODJEDO SYLVIE	Responsable Volet Social	ANTEA
2	TOSSAH ISAAC	Assistant Responsable Volet Social	ANTEA
3	RAHKMATOULAH CISSE	Responsable Environnemental et Social	SIPI / ARISE
4	MOUTANGOU HERBERT	Responsable Commercial	SIPI / ARISE

***Tableau récapitulatif des participants***

Participants	EFFECTIF		
	H	F	TOTAL
ANTEA	1	1	2
ARISE	1	1	2
VILLAGE	47	-	47
TOTAL	49	2	51

Types de techniques utilisées	
<input checked="" type="checkbox"/> présentation power point <input type="checkbox"/> Présentation Poster <input type="checkbox"/> Questions- Réponses <input type="checkbox"/> médias <input type="checkbox"/> photos	
<b>Objectif de la rencontre</b> Présenter le projet et les résultats de l'EIES aux populations des VILLAGES impactés par le projet	<b>Résultats attendus</b> 1- Le projet est mieux appréhendé par les populations 2- Les résultats de l'EIES sont connus par les populations 3- Les préoccupations des populations sont exprimées et les réponses apportées
<b>Questions posées</b> <b>Questions posées</b> 1- Comment faire pour savoir si nos terres sont dans les limites des 400 ha où se déroulent actuellement le recensement des personnes impactées par le projet? 2- Pourquoi le projet porte le nom de Glo- Djigbé alors qu'il couvre uniquement les périmètres de Zè et de de Tori- Bossito?  3- Qu'en est-il de toutes ses superficies dont on entend parler (10.000hectares, 20hectares, 400 hectares et maintenant 1462hectares?  4- Qu'est –ce qui garantit que le recrutement de la main d'œuvre se fera avec priorité au niveau local et que comme ça se passe souvent ailleurs; les recruteurs n'auront-ils pas tendance à prioriser leurs enfants et parents qui chôment et qui sont à la maison  5- Que deviendront ceux qui ne savent rien faire d'autres que les travaux champêtres et de surcroit ne savent ni lire et écrire? Pourront-ils survivre avec ce projet? De quoi sera fait notre venir? Comment allons-nous vivre? Quel genre de travail on pourrait donner à un non lettré	<b>Réponses apportées</b> ➤ C'est à votre arrondissement que vous aurez les informations appropriées  ➤ Le nom Glo- Djigbé est donné dans une logique de développement global de la zone de l'aéroport et de la Zone Economique Spéciale (ZES) qui s'étend jusqu'à Allada et inclut donc la zone Industrielle. A notre avis, cette logique ne cache aucune intention de faire la promotion d'une commune au détriment de celles qui ont effectivement subies une expropriation.  ➤ Les 10.000hectares représentent le périmètre de la zone économique spéciale (ZES). Les 1462 hectares représentent le périmètre de la zone industrielle et sont inclus dans le périmètre de la ZES. Les 20 puis 400hectares représentent le périmètre délimité pour la première phase du projet et sur lequel sont actuellement recensés les sinistrés. ➤ Vos craintes sont justes. Et vous faites bien de les formuler. Comme les représentant du promoteur sont avec nous, ils prennent bonne note et en son temps y veilleront.  ➤ Nous comprenons vos appréhensions, mais le présent projet va se faire suivant non seulement les normes nationales mais également suivant les normes internationales. Essayer de prendre

<p>sur le site? Ne va t'on pas nous exiger des diplômes?</p> <p>6- Où allons-nous désormais faire nos besoins car nous n'avons pas de wc?</p> <p>7- Quel sort sera réservé à nos cultures qui sont présentement sur le site et qu ne sont pas encore arrivées à maturité?</p> <p>8- Quel sera le coût de notre dédommagement? Est- ce que le coût du dédommagement sera proportionnel à la valeur des terres qui nous sont arrachées? va t'on nous trouver d'autres terres?</p> <p>9- Peut-on recruter à la fois les parents et les enfants d'une même famille sur le site</p> <p><b>10-</b> La proximité des Villages de la zone industrielle ne serait-elle pas utilisée comme prétextes pour nous expulser dans les prochaines années de nos Villages à cause de la pollution et des émanations toxiques des industries pour la santé de l'homme?</p> <p>11- Quel sort réserve t-on à nous autre qui avons déjà été hier expulser de chez notre père dans la zone de l'aéroport, qui avons trouvé refuge chez notre oncle ici et qui allons de nouveau subir l'expropriation?</p>	<p>vos mal en patience et attendez que les travaux commencent.</p> <ul style="list-style-type: none"> <li>➤ Le Personnel Arise présent à cette séance, note également cette préoccupation que vous avez.</li> <li>➤ Le cabinet INSUCO en son temps répondra à cette question</li> <li>➤ Pour toutes les questions sur le dédommagement vous aurez vos réponses avec le Cabinet INSUCO qui travaille en ce moment sur le terrain sur le Plan d'Action de Réinstallation et de Compensation (PARC). Quand il finira ses travaux, il aura une séance semblable avec vous et donnera réponses à vos préoccupations.</li> <li>➤ Si les enfants sont en âge de travailler et recherchent un emploi et qui plus est, s'ils ont des compétences, pourquoi pas?</li> <li>➤ Notre étude a en prélude à la pollution, recommandée que des mesures soient prises. De plus le promoteur à prévue des centres de traitement des eaux usées, des déchets et autres pour réduire au maximum les effets de pollution. Et pour finir, on peut dire que c'est dans un souci de sauvegarde des entités culturelles, des tissus associatifs que l'Etat à choisi de ne pas prendre les terres en continues.</li> <li>➤ Nous comprenons votre révolte, nous pensons que cette fois ci, le dédommagement pourrait se révélé pus intéressant.</li> </ul>
<p><b>Quel aspect de la restitution a le plus retenu l'attention des participants ?</b></p> <ul style="list-style-type: none"> <li>➤ Le coût du dédommagement</li> <li>➤ Le recrutement de la main d'œuvre locale</li> </ul>	<p><b>Quel aspect de la restitution les participants ont eu le plus de difficultés à comprendre ?</b></p> <ul style="list-style-type: none"> <li>➤ Le Nom porté par le projet ; Glo- Djigbé alors qu'il se situe sur le périmètre des communes de Zè et de Tori- Bossito</li> </ul> <p><b>Quel aspect de la restitution les participants ont eu du mal à croire?</b></p>



- L'effectivité de la priorisation de la main d'œuvre locale.

**Recommandations et actions à engager :**

- Qu'on ne nous oppose pas les diplômes pour nous recruter
- Qu'on ne nous expulse pas un jour de notre VILLAGE du fait de la proximité de la zone industrielle.




Nom des autres participants

N.	Nom Prénom	Fonction	N. de téléphone
1	HOUESSA Rigobert	Conseiller Village	64594053
2	NOUGBOGNON Yemah	Cultivateur	97591195
3	TENONTO Vincent	"	62553566
4	TENONTO Paul	"	-
5	KOUDEDO Honoré	Organisateur	99278580
6	HOUNGBEMINS. Pire	Producteur	65848499
7	TENONTO Jérôme	"	-
8	KPOSSA Bertan	Magari	97427627
9	TELEHOUÉ Fabrice	Etudiant	60536856
10	SDG. MONDE Samel	Matellier	-


Signature

Nom du ou des responsables de l'activité

  
Sylvie KPODSEDO

Visa

Nom et titre de l'Autorité villageoise ( CV)

  
HOUESSA Rigobert  
(Conseiller)

**Compte rendu de :**

**Consultations publiques de restitution des Résultats de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

**Lieu : Place publique d'Anavié**

**Date : 6/11/2020**

**Heure : 13h55**

Commune : **Zè**

Arrondissement : **Tangbo-Djèvié**

VILLAGE : **Anavié**

Date **06 / 11 / 2020** ] Heure de début **13 h 55 mn** ] Heure de Clôture **15 h 30 mn**

Responsable de l'activité (Nom et Prénoms/Titre) : **KPODJEDO Sylvie, Chargée du volet Social**

***Personnes associées à l'activité***

N° d'ordre	Nom et Prénoms	Titre	Structure
1	KPODJEDO SYLVIE	Responsable Volet Social	ANTEA
2	TOSSAH ISAAC	Assistant Responsable Volet Social	ANTEA
3	RAHKMATOULAH CISSE	Responsable Environnemental et Social	SIPI / ARISE
4	MOUTANGOU HERBERT	Responsable Commercial	SIPI / ARISE

***Tableau récapitulatif des participants***

Participants	EFFECTIF		
	H	F	TOTAL
ANTEA	1	1	2
ARISE	1	1	2
VILLAGE	31	1	32
TOTAL	33	3	36

Types de techniques utilisées	
<input checked="" type="checkbox"/> présentation power point <input type="checkbox"/> Présentation Poster <input type="checkbox"/> Questions- Réponses <input type="checkbox"/> médias <input type="checkbox"/> photos	
<b>Objectif de la rencontre</b> 1- Présenter le projet et les résultats de l'EIES aux populations des Villages impactés par le projet	<b>Résultats attendus</b> 4- Le projet est mieux appréhendé par les populations 5- Les résultats de l'EIES sont connus par les populations 6- Les préoccupations des populations sont exprimées et les réponses apportées
<b>Questions posées</b> <b>Questions posées</b> 1- Pourquoi le projet porte le nom de Glo- Djigbé alors qu'il couvre uniquement les périmètres de Zè et de de Tori- Bossito?  2- Quelle est la stratégie mise en place pour épargner et respecter la forêt sacrée?  3- Qu'est –ce qui garantit que le recrutement de la main d'oeuvre se fera avec priorité au niveau local et que comme ça se passe souvent ailleurs; les recruteurs n'auront-ils pas tendance à prioriser leurs enfants et parents qui chôment et qui sont à la maison  4- Que deviendront ceux qui ne savent rien faire d'autres que les travaux champêtres et de surcroit ne savent ni lire et écrire? Pourront-ils survivre avec ce projet? De quoi sera fait notre venir? Comment allons-nous vivre? Quel genre de travail on pourrait donner à un non lettré sur le site? Ne va t'on pas nous exiger des diplômes?  5- Quel sera le coût de notre dédommagement? Est- ce que le coût du dédommagement sera proportionnel à la valeur des terres qui nous	<b>Réponses apportées</b> ➤ Le nom Glo- Djigbé est donné dans une logique de développement global de la zone de l'aéroport et de la Zone Economique Spéciale (ZES) qui s'étend jusqu'à allada et inclut donc la zone Industrielle. A notre avis, cette logique ne cache aucune intention de faire la promotion d'une commune au détriment de celles qui ont effectivement subies une expropriation.  ➤ Concernant la forêt sacrée, nous avons eu ici des entretiens pour trouver ensemble une approche de sa préservation. INSUCO à l'issue de ses travaux vous tiendra informer de ce qui est retenu pour la forêt.  ➤ Vos craintes sont justes. Et vous faites bien de les formuler. Comme les représentant du promoteur sont avec nous, ils prennent bonne note et en son temps y veilleront.  ➤ Nous comprenons vos appréhensions, mais le présent projet va se faire suivant non seulement les normes nationales mais également suivant les normes internationales. Essayer de prendre votre mal en patience et attendez que les travaux commencent.  ➤ Pour toutes les questions sur le dédommagement vous aurez vos réponses avec le Cabinet INSUCO qui travaille en ce moment sur le terrain sur le Plan d'Action de

<p>sont arrachées? va t'on nous trouver d'autres terres?</p> <p>6- La proximité des Villages de la zone industrielle ne serait-elle pas utilisée comme prétextes pour nous expulser dans les prochaines années de nos VILLAGES à cause de la pollution et des émanations toxiques des industries pour la santé de l'homme?</p>	<p>Réinstallation et de Compensation (PARC). Quand il finira ses travaux, il aura une séance semblable avec vous et donnera réponses à vos préoccupations.</p> <p>➤ Notre étude a, en prélude à la pollution, recommandée que des mesures soient prises. De plus le promoteur a prévu des centres de traitement des eaux usées, des déchets et autres pour réduire aux maximum les effets de pollution. Et pour finir, on peut dire que c'est dans un souci de sauvegarde des Villages qui constituent des entités culturelles, que l'Etat a choisi de ne pas prendre les terres en continue. Et de sauvegarder les VILLAGES.</p>
<p><b>Quel aspect de la restitution a le plus retenu l'attention des participants ?</b></p> <p>➤ Le coût du dédommagement</p> <p>➤ Le recrutement de la main d'œuvre locale</p> <p>➤ La sauvegarde de la forêt sacrée</p> <p>➤</p>	<p><b>Quel aspect de la restitution les participants ont eu le plus de difficultés à comprendre ?</b></p> <p>➤ Le Nom porté par le projet ; Glo- Djigbé alors qu'il se situe sur le périmètre des communes de Zè et de Tori- Bossito</p> <p><b>Quel aspect de la restitution les participants ont eu du mal à croire?</b></p> <p>➤ L'effectivité de la priorisation de la main d'œuvre locale.</p>
<p><b>Recommandations et actions à engager :</b></p> <p>➤ Qu'on ne nous oppose pas les diplômes pour nous recruter</p> <p>➤ Qu'on ne nous expulse pas un jour de notre VILLAGE du fait de la proximité de la zone industrielle.</p> <p>➤ L'actuel délimitation du périmètre d'ARISE. Se présente comme une ceinture autour du VILLAGE d'Anavié, elle est trop rapprochée du VILLAGE. Nous souhaiterions que le promoteur recule un tout petit peu !</p> <p>➤ Etant donné que nous sommes tous « glo » et cela de la commune de glo- Djigbé jusqu'à allada, nous souhaiterions qu'en lieu et place de « zone industrielle de Glo- Djigbé », qu'une légère correction soit faite et qu'on mette « zone industrielle de Glo »</p>	



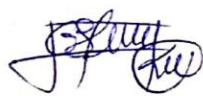


Nom des autres participants

N.	Nom Prénom	Fonction	N. de téléphone
1	KPATINNO Norbert	chef village	97 9382 36
2	AFFOYEDE Nicolas	Producteur	64 0574 37
3	ANAGOUNOU Louien	"	97 8451 96
4	NDUMANKON Alain	"	65 6767 77
5	NDUMARKON Fero	"	91 2909 03
6	KPATINNO Odjo	"	-
7	NDUMARKON Fidèle	"	95 1999 46
8	DOMAGO Olivier	Chauffeur	62 6960 75
9	DOMAGO Tatchégnon	Producteur	-
10	DOMAGO Pierre	Plombier	66 4728 53

Signature

Nom du ou des responsables de l'activité

  
KPOJEDD Sylvie

Visa  
Nom et titre de l'Autorité villageoise (CV)

  
KPATINNO Norbert

**Compte rendu de :**

**Consultations publiques de restitution des Résultats de l'EIES internationale du Projet de Zone industrielle de Glo-Djigbé porté par Arise Bénin et la République du Bénin**

**Lieu : Place publique Agbondjêdo**

**Date : 06/11/2020**

**Heure : 16h50**

Commune : **Zè**

Arrondissement : **Tangbo-Djèvié**

VILLAGE : **Agbondjêdo**

Date **06 / 11 / 2020** ]

Heure de début **16 h 50 mn** ]

Heure de Clôture **18 h 15 mn**

Responsable de l'activité (Nom et Prénoms/Titre) : **KPODJEDO Sylvie, Chargée du volet Social**

***Personnes associées à l'activité***

N° d'ordre	Nom et Prénoms	Titre	Structure
1	KPODJEDO SYLVIE	Responsable Volet Social	ANTEA
2	TOSSAH ISAAC	Assistant Responsable Volet Social	ANTEA
3	RAHKMATOULAH CISSE	Responsable Environnemental et Social	SIPI / ARISE
4	MOUTANGOU HERBERT	Responsable Commercial	SIPI / ARISE

***Tableau récapitulatif des participants***

Participants	EFFECTIF		
	H	F	TOTAL
ANTEA	1	1	2
ARISE	1	1	2
VILLAGE	26	22	48
TOTAL	28	24	52

Types de techniques utilisées	
<input checked="" type="checkbox"/> présentation power point <input type="checkbox"/> Présentation Poster <input type="checkbox"/> Questions- Réponses <input type="checkbox"/> médias <input type="checkbox"/> photos	
<b>Objectif de la rencontre</b> 5- Présenter le projet et les résultats de l'EIES aux populations des VILLAGEs impactés par le projet	<b>Résultats attendus</b> 6- Le projet est mieux appréhendé par les populations 7- Les résultats de l'EIES sont connus par les populations 8- Les préoccupations des populations sont exprimées et les réponses apportées
<b>Questions posées</b> <b>Questions posées</b> 8- Quelle sera la part réservée aux jeunes et aux femmes dans ce projet. Car la réalité est que les femmes souffriront énormément du projet car elles ne pourront plus avoir accès aux ressources ligneuses pour la cuisson domestique mais aussi comme source de revenus ? 9- Qu'est –ce qui garantit que le recrutement de la main d'œuvre se fera avec priorité au niveau local et que comme ça se passe souvent ailleurs; les recruteurs n'auront-ils pas tendance à prioriser leurs enfants et parents qui chôment et qui sont à la maison 10- Que deviendront ceux qui ne savent rien faire d'autres que les travaux champêtres et de surcroît ne savent ni lire et écrire? Pourront-ils survivre avec ce projet? De quoi sera fait notre venir? Comment allons-nous vivre? Quel genre de travail on pourrait donner à un non lettré sur le site? Ne va t'on pas nous exiger des diplômes? 11- Quel sort sera réservé à nos plantations dans les champs qui sont présentement sur le site et qui sont déjà arrivées à maturité et n'attendent que la récolte? Nous laisserait-on les récolter ? 12- Quel sera le coût de notre dédommagement? Est- ce que le coût du dédommagement sera	<b>Réponses apportées</b> ➤ Dans le projet justement, les recommandations de l'EIES mettent un accent particulier sur la Prise en charge particulière des femmes et des personnes vulnérables. Les jeunes aussi ne manqueront pas d'emplois dans le projet ➤ Vos craintes sont justes. Et vous faites bien de les formuler. Comme les représentant du promoteur sont avec nous, ils prennent bonne note et en son temps y veilleront. ➤ Nous comprenons vos appréhensions, mais le présent projet va se faire suivant non seulement les normes nationales mais également suivant les normes internationales. Essayer de prendre votre mal en patience et attendez que les travaux commencent. ➤ Rapprocher-vous de votre Chef VILLAGE qui est dans le comité mise en place à l'arrondissement pour le recensement- compensation, il saura mieux vous répondre. ➤ Pour toutes les questions sur le dédommagement vous aurez vos réponses avec le Cabinet INSUCO qui travaille en ce moment sur le terrain sur le Plan d'Action de

<p>proportionnel à la valeur des terres qui nous sont arrachées? va t'on nous trouver d'autres terres?</p> <p><b>13-</b> La proximité des Villages de la zone industrielle ne serait-elle pas utilisée comme prétextes pour nous expulser dans les prochaines années de nos Villages à cause de la pollution et des émanations toxiques des industries pour la santé de l'homme?</p> <p>14- Quel sort réserve-t-on à nous autre qui avons déjà été hier expulsé de chez notre père dans la zone de l'aéroport, qui avons trouvé refuge chez notre oncle ici et qui allons de nouveau subir l'expropriation?</p> <p>15- Quelle sera le sort de ceux qui ne sont ni propriétaires terriens, ni exploitant mais juste de la main d'œuvre utilisée dans les champs, dans le processus d'expropriation ?</p>	<p>Réinstallation et de Compensation (PARC). Quand il finira ses travaux, il aura une séance semblable avec vous et donnera réponses à vos préoccupations.</p> <p><b>2-</b> Notre étude a en prélude à la pollution, recommandée que des mesures soient prises. De plus le promoteur a prévue des centres de traitement des eaux usées, des déchets et autres pour réduire aux maximum les effets de pollution. Il va trouver le mécanisme d'astreindre les autres industries qui vont s'implanter dans la zone à préparer plusieurs plans de gestion de la biodiversité, des émissions atmosphériques et du bruit, de l'érosion et de la qualité des sols, des déchets, des ressources en eau et des rejets liquides. Et pour finir, on peut dire que c'est dans un souci de sauvegarde des entités culturelles, et tissus associatifs, que l'Etat a choisi de ne pas prendre les terres en continues.</p> <p>➤ Nous comprenons votre révolte, nous pensons que cette fois ci, le dédommagement pourrait se révéler plus intéressant.</p> <p>➤ Rapprochez-vous de votre Cv qui est dans le comité de dédommagement pour en apprendre davantage sur cette préoccupation. De même la chargée du volet environnemental et social, présente ici à cette rencontre enregistre cette préoccupation et en son temps vous aurez la réponse.</p>
<p><b>Quel aspect de la restitution a le plus retenu l'attention des participants ?</b></p> <p>➤ Le coût du dédommagement</p> <p>➤ Le recrutement de la main d'œuvre locale</p>	<p><b>Quel aspect de la restitution les participants ont eu le plus de difficultés à comprendre ?</b></p> <p><b>Quel aspect de la restitution les participants ont eu du mal à croire?</b></p> <p>➤ L'effectivité de la priorisation de la main d'œuvre locale.</p>

### Recommandations et actions à engager :

- Nous souhaiterions qu'on ne nous oppose pas les diplômes pour nous recruter
- Nous souhaiterions qu'on ne nous expulse pas un jour de notre VILLAGE du fait de la proximité de la zone industrielle de notre VILLAGE.





Nom des autres participants

N.	Nom Prénom	Fonction	N. de téléphone
1	ZANMENDU Calixte	Conseiller Village	96639023
2	HOUNKPATIN Victorin	Eleveur	97399509
3	KOUDESSA Pascal	Cultivateur	61789614
4	GANSE Célestine	11	-
5	KOUDESSA Josephine	11	-
6	HOUNKPATIN Christine	11	-
7	KINTOLO Adèle	11	-
8	MINANNON Rodolphe	11	-
9	HOUNKPATIN Wilfried	Elite	60930467
10	KOUKOU Clotilde	Revendeuse	-

Signature



Nom du ou des responsables de l'activité

*[Signature]*

KPOUJED Sylvie

Nom et titre de l'Autorité villageoise ( CV)

*[Signature]*  
ZANMENDU Calixte

Annex XV **Content of a Resettlement action plan according to  
World Bank Performance Standard No. 5**

### 1. Description of the project

General description of the project and identification of the project area

### 2. Potential effects

Identification:

- (a) the components or activities of the project that create displacement, explaining why the land retained is to be acquired and used during the life of the project;
- (b) the area of impact of these components or activities;
- (c) the scope and scale of land acquisitions and the effects of such acquisitions on physical works and other capital assets;
- (d) any restrictions imposed by the project on the use of, and access to, land or other natural resources;
- (e) alternatives to the project design that are considered to avoid or minimize displacement and the reasons why they have been rejected; and
- (f) mechanisms put in place to minimize travel, to the extent possible, during project implementation.

### 3. Objectives

The main objectives of the resettlement program

### 4. Census and socio-economic baseline studies

The findings of a household census to identify and enumerate affected persons and, with the participation of affected persons, to conduct topographical surveys, survey works and other capital assets that may be affected by the project. The census also performs other essential functions:

- (a) To identify the characteristics of displaced households, including a description of household structure and the organization of production and work; and to collect baseline data on the livelihoods (including, where appropriate, levels of production and income generated by formal and informal economic activities) and standards of living (including health status) of the displaced population;
- (b) Gather information on vulnerable groups or persons for whom special arrangements are likely to be needed;
- (c) Identify infrastructure, services or public or collective goods likely to be affected;
- (d) Establish a basis for the design and budgeting of the resettlement program;
- (e) Establish a basis for excluding persons who are ineligible for compensation and resettlement assistance at the same time as an eligibility deadline is set;
- (f) Establish baseline conditions for monitoring and evaluation purposes.

### 5. Legal framework

The results of an analysis of the legal framework, covering:

- (a) The extent of the power to expropriate and impose restrictions on land use and the nature of the related compensation, including both the valuation methodology and the time limits for payment;
- (b) Applicable legal and administrative procedures, including a description of the means of redress available to displaced persons during legal proceedings and the normal timeframe for such

proceedings, as well as any complaint management mechanisms available and applicable under the project;

(c) Laws and regulations concerning the agencies responsible for the implementation of resettlement activities;

(d) Disparities, if any, between local laws and practices regarding expropriation, imposition of land use restrictions and establishment of resettlement measures and the provisions of NES No. 5, as well as mechanisms to address such disparities.

#### *6. Institutional framework*

(a) Identification of agencies responsible for resettlement activities and NGOs/CSOs likely to play a role in the implementation of the project; including providing assistance to displaced persons;

(b) An assessment of the institutional capacities of these agencies and NGOs/CSOs;

(c) Any proposed measures to strengthen the institutional capacities of agencies and NGOs/CSOs responsible for implementing resettlement activities.

#### *7. Admissibility*

Definition of displaced persons and criteria for determining their eligibility for compensation and other resettlement assistance, including relevant deadlines.

#### *8. Assessment of losses and compensations*

The method that should be used to assess losses in order to determine their replacement cost; and a description of the types and levels of compensation proposed for land, natural resources and other assets under local law and the additional measures deemed necessary to achieve replacement cost in each case.

#### *9. Community Involvement*

Involvement of displaced persons (including host communities, where applicable)

(a) A description of the strategy for consultation and participation of displaced persons in the design and implementation of resettlement activities;

(b) A summary of the views expressed and how these views were taken into account in the preparation of the resettlement plan;

(c) An examination of the resettlement options proposed and the choices made by the IDPs among the options submitted to them;

(d) Institutionalized mechanisms through which displaced persons can convey their concerns to project officials throughout the planning and implementation phases, and measures to ensure that vulnerable groups such as indigenous peoples, ethnic minorities, landless peasants and women are adequately represented.

#### *10. Schedule for implementation*

An implementation schedule providing the anticipated displacement dates, and an estimate of the start and completion dates of all activities in the relocation plan. This schedule should indicate how the relocation activities are linked to the implementation of the overall project.

#### 11. Cost and budget

Tables presenting cost estimates by line item for all resettlement activities, including adjustments for inflation, population growth and other contingencies; the timing of expenditures; sources of funding; and arrangements for the timely availability of funds and for the funding of resettlement, where applicable, to areas outside the jurisdiction of implementing agencies.

#### 12. *Complaint management mechanism*

The plan describes affordable and accessible procedures for third-party dispute resolution arising from the displacement or resettlement of affected populations; these complaint management mechanisms should take into account the availability of judicial remedies and community and traditional dispute resolution mechanisms.

#### 13. *Monitoring and assessment*

Devices for the monitoring of displacement and resettlement activities by the executing agency, completed by independent controls deemed appropriate by the Bank, to ensure complete and objective information; performance monitoring indicators to measure inputs, outputs and outcomes associated with resettlement activities; participation of the displaced in the monitoring process; evaluation of results within a reasonable period of time after completion of all resettlement activities; using the results of monitoring of resettlement activities to guide further implementation of the project.

#### 14. *Provisions for adaptive management*

The plan should include provisions to adapt the implementation of resettlement activities to unforeseen changes in project conditions, or unexpected difficulties to achieve satisfactory resettlement results.

### ***In case of physical displacement:***

#### 1. *Transitional aid*

The plan describes the assistance that will be provided for the relocation of families and their assets (or business equipment and stocks). It also describes any additional assistance required for households that choose to receive cash compensation and to seek alternative accommodation on their own, including the construction of a new home.

Where the sites planned for relocation (for housing or business) cannot yet be occupied at the time of the physical move, the plan shall establish a transitional allowance sufficient to cover temporary rental and other associated costs until such sites are ready.

#### 2. *Site selection, preparation and resettlement*

Where sites for the relocation are to be prepared, the relocation plan shall describe the other relocation sites being considered and the rationale for the selection of the sites selected, including the following elements:

(a) The institutional and technical arrangements in place to identify and prepare resettlement sites, whether rural or urban, whose combination of productive potential, locational advantages and other



characteristics is better or at least comparable to the advantages of former sites; together with an estimate of the time required to acquire and dispose of the land and related resources;

(b) The identification and examination of opportunities to improve local living conditions by making additional investments (or establishing mechanisms for sharing the benefits derived from the project) in infrastructure, equipment or services;

(c) All necessary measures to prevent land speculation or the influx of ineligible persons to the selected sites;

(d) Procedures for physical resettlement under the project, including time frames for site preparation and divestment;

(e) The legal modalities for regularization of ownership and transfer of title to resettled persons, including security of tenure for persons who did not have full rights to the land or structures concerned.

### *3. Housing, infrastructure and social services*

Plans aimed at providing (or financing the provision to the local community) of housing, infrastructure (e.g. water supply, feeder roads, etc.) and social services (e.g. schools, health centers, etc.); plans to maintain or provide a comparable level of services to the host population; any site development, civil engineering works and architectural plans for such facilities.

### *4. Protection and management of the environment*

A description of the boundaries of the proposed relocation sites; and an assessment of the environmental impact of the proposed relocation and measures to mitigate and manage that impact (coordinated as much as possible with the environmental assessment of the main investment occasioning the relocation).

### *5. Consultation on the terms and conditions of the relocation*

The plan describes methods for consulting the physically displaced on their preferences among the resettlement options available to them, including, where appropriate, choices relating to forms of compensation and transitional assistance, the resettlement of single families or pre-existing communities or related groups, the maintenance of group organization patterns, and the relocation of or access to cultural property (e.g. places of worship, pilgrimage centers and cemeteries).

### *6. Integration into host communities*

Measures to mitigate the impact of planned resettlement sites on host communities, including:

(a) Consultations with host communities and local authorities;

(b) Arrangements for the prompt payment of any payments due to the hosts for land or other property ceded for the benefit of the proposed resettlement sites;

(c) Provisions for identifying and resolving conflicts that may arise between resettled persons and host communities; and

(d) Any measures necessary to strengthen services (e.g. education, water, health and production services) in host communities to meet the increased demand for such services or to bring them to a level at least comparable to the services available in the planned relocation sites.

### *In case of economic displacement:*

1. *A direct replacement of land*

For people who make a living from farming, the relocation plan offers the option of receiving replacement land of equivalent productive value or demonstrates that sufficient land of equivalent value is not available. Where replacement land is available, the plan describes how and when it will be allocated to the displaced persons.

26. *Loss of access to land or to resources*

For persons whose livelihoods are affected by the loss of land, use of resources or access to land or resources, including communally owned resources, the resettlement plan shall describe the means of obtaining alternative or replacement resources, or otherwise provide support for alternative livelihoods.

2. *Alternative livelihood support*

For all other categories of economically displaced persons, the resettlement plan shall describe possible ways of obtaining employment or setting up a business, including through the provision of appropriate additional assistance, such as vocational training, credit, licences or permits, or specialized equipment.

Where necessary, the livelihood plan shall provide special assistance to women, minorities or vulnerable groups who may find it more difficult than others to pursue alternative livelihoods.

3. *Analysis of economic development opportunities*

The resettlement plan identifies and assesses all opportunities for the promotion of improved livelihoods as a result of the resettlement process. These may include, for example, preferential employment arrangements within the project, support for the development of specialized products or markets, the establishment of trade areas and preferential trade agreements, or other measures. Where appropriate, the plan should also identify the possibility of allocating financial resources to communities, or directly to displaced persons, through the establishment of benefit-sharing mechanisms for the benefits derived from the project.

4. *Transitional assistance*

The resettlement plan provides transitional assistance to those whose livelihoods will be disturbed. This may include payments to compensate for the loss of crops and natural resources, loss of income suffered by businesses or employees affected by the relocation of businesses. The plan provides for this transitional support to continue throughout the transition period.

## **Annex XVI Minutes of Meeting with Anavie village authorities on sacred forest**

Rencontre Avec les autorités locales  
et religieuses du village de Anavié  
Pour déterminer les mesures de Protection  
et les conditions d'accès à la Forêt  
sacrée d'Anavié

L'an deux mille vingt et le vingt cinq  
Août, a eu lieu une séance avec les  
autorités villageoises (chef village et ses  
conseillers, chefs religieux <sup>sages</sup> et les adeptes de  
cultes traditionnelles), pour déterminer les  
mesures de Protection et les conditions d'accès  
à la Forêt sacrée de Anavié, dans le  
cadre du projet de Zone Industrielle de  
ARISÈ.

Commencé à 14h 25 mn, la chargée  
du volet sociale a expliqué aux participants  
les objectifs de la rencontre qui sont essentielle-  
ment de :

- Déterminer les mesures de Protection  
de la Forêt
- Assurer l'accès à la Forêt sacrée  
aux praticiens pour pouvoir continuer leur  
rituels sacrés.

Prenant la parole, le chef village



a assurer que la forêt sacrée est bien  
la propriété spirituelle du village de Anavé  
pour qui il représente beaucoup, cette forêt  
est née de l'initiative de leur ancêtre qui  
l'ont installée et y font des pratiques que eux,  
leur descendant continuent de pratiquer aujourd'hui

Penser à sa protection pour nous favoriser  
son accès est vraiment une bonne chose.  
Bronout la parole, le sage et chef religieux

Batinvo Ojo a compter l'histoire de  
l'initiation de la forêt en forêt sacrée, qui  
date du temps de leur ancêtre et a saluer  
le souhait du promoteur de leur favoriser  
l'accès à celle-ci pour continuer leur pratique.

D'autres participants à la séance (12) ont  
abondé dans le même sens que les deux premiers  
et saluer l'initiative le souhait du promoteur  
qui entend leur favoriser l'accès.

Comme mesure de Protection de la forêt  
sacrée de Anavé les participants à la séance

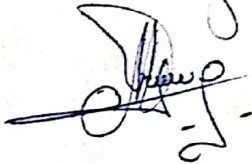
ont unanimement souhaité que :

- Le Promoteur déloge la forêt de la zone  
industrielle en faisant passer sa clôture derrière  
la forêt de sorte à permettre à la population un  
accès libre pour ses rituels sacrés dans la  
forêt.



- ~~On~~ Le promoteur puisse respecter les premières limites de la Zone Industrielle de ARISE qui n'engraissent pas la forêt sacrée au niveau de Anavé.  
La séance a pris fin à 12 h 30 mn après la synthèse de la charge de l'équipe sociale et sur la satisfaction de tous les participants

ont signé



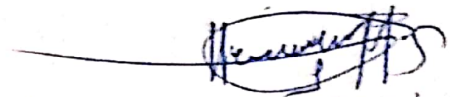
KRATINVO Norbert



KRATINVO Odjo



DOMAGO Marcel



NOUMAKON Michel

M

DOMAGO Prospère

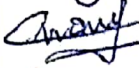

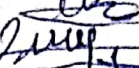
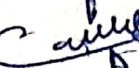



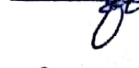
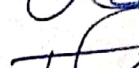


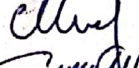
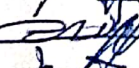
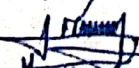


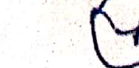



HOUSOU Basile

ANAVIE LE 25 AOUT 2020

Séance d'entretien public sur la forêt sacrée  
d'ANAVIE

Liste de présence des autorités villageoises




N°	Nom et prénoms	Contact	Fonction	Signature
1	NOUMANKON Freddy	91290906	Etudiant	
2	KPATINVOI Pierre	61690480	Cultivateur	
3	MIGNONHIN Fabien	96615320	"	
4	HOUSSEU Basile	97966397	"	
5	DOMAGD Louis	97357903	Chauffeur	
6	NOUMANKO Joseph	-	Cultivateur	
7	KPATINVO Lucien	97151436	"	
8	ANAGONDO Lucien	97845196	"	
9	AFFOYÉ Valentin	91780287	Photographe	
10	NOUMANKON Dieu-Jonné	96979553	Cultivateur	
11	DOMAGD Globo Raimon	62787047	"	
12	DOMAGD Léon	94568806	"	
13	NOUMANKON Paul	60768065	"	
14	MIGNONHIN Ignace	90253913	"	
15	NOUMANKON Fidèle	95199946	Producteur	
16	KLOGBO Clément	90031003	"	
17	DOMAGD Marc	90427931	"	
18	DOMAGD Rodolphe	61605465	Conducteur	
19	HONFO Augustin	66285171	Cultivateur	
20	DOMAGD Victorin	-	"	

(4)



N°	Nom et Prénoms	Contact	Fonction	Signature
21	KLOGBO H. Elie	97 03 27 80	Cultivateur	
22	AFFOVEDE Philippe	-	" "	
23	AHOUANJINDU Hypolite	65 88 20 34	" "	
24	KPATINVO Olivier	61 71 81 39	" "	
26	KEGBD Marcellin	51 38 28 19	Vulcanisateur	
27	AHOUANJINDU Nestor	91 20 01 56	Cultivateur	
28	DOMAGO Marcel	97 99 31 47	" "	
29	AFFOVEDE Raymond	97 50 67 68	" "	
30	AFFOVEDE Firmin	-	" "	
31	AFFOVEDE Nicolas	64 05 79 37	Tailleur	
32	DOMAGO Alfred	96 34 04 51	Cultivat	
33	AFFOVEDE Landry	97 59 17 31	" "	
34	NDUMAKON Michel	64 27 17 78	" "	
35	NDUMAKON Jendi	65 07 77 02	" "	
36	NDUMAKON Bernard	63 41 22 74	" "	
37	DOMAGO Dorothe	68 11 34 42	Chauffeur	
38	DOMAGO Blaise	94 70 09 16	Cultivat	
39	DOMAGO Prosper	61 71 92 88	" (Age)"	
40	KPATINVO Dago	-	" "	
41	DOMAGO Justin	96 55 00 80	" "	
42	KPATINVO Norbert (CV)	95 25 03 79	Plombier	
43	MIGNONHIN, Luc	96 61 37 59	Cultivateur	
44	DOMAGO Octave	69 34 86 70	" "	
45	KPATINVO Eddy	97 51 47 02	" "	
46	DOMAGO Olivier	62 69 60 75	Chauffeur	
47	KPATINVO Isaac	65 96 31 01	Cultivateur	
48	DOMAGO Janvier	91 94 43 85	Electricien	



N°	Nom et Prénoms	Contact	Fonction	Signature
49	DOMAGO Aaron	91780203	Tailleur	
50	AFFOVEDE Yves	63853438	Etudiant	
51	DOMAGO Tatchégnon	—	Cultivateur	
52	AHOUANJINDU Augustin	—	17	