

**République du Sénégal**

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Un Peuple – Un But – Une Foi  
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**ASER SOLAR RURAL ELECTRIFICATION PROJECT**

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**Fatick, Kafrine, Kaolack, Kolda, Kédougou, Tambacounda and  
Saint-Louis**

**Environmental and Social Impact Assessment (ESIA)**

*Preliminary Version*

**CONDUCTED BY:**



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## **Acronyms and Abbreviations**

ANSD:	National Agency for Statistics and Demography
ARD:	Regional Development Agency
ASER :	Senegalese Rural Electrification Agency
B2 :	Authorization of the LV electrical works manager
BP:	Authorization of the person in charge of operations on photovoltaic installations
BT:	Low Voltage ( $50 < U \leq 1.000$ volts)
AC:	Alternating current
DC:	Direct current
CO2:	Carbon Dioxide
CRD:	Regional Development Committee
CRSE:	Regional Environmental Monitoring Committee
CSPS:	Safety and Health Protection Coordinator
DAO:	Tender Documents
DE:	Implementation files
DEEC:	Direction de l'Environnement et des Établissements Classés (Department of the Environment and of Classified Establishments)
DGPRE:	Directorate of Water Resources Management and Planning
DREEC:	Regional Division of Environment and Classified Establishments
DRP:	Request for Information and Prices
ESA:	Environmental and Social Assessment
ESIA:	Environmental and Social Impact Assessment
ERP:	Establishments Receiving the Public
ESM:	Environmental and Social Management
HSS:	Hygiene, Health and Safety
IEC:	Information-Education-Communication
kWp:	Kilowatt peak
LOASP:	Loi d'Orientation Agro Sylvo-Pastorale (Agro Sylvo Pastoral Orientation Law)
m <sup>2</sup> :	Square meter
ml:	Linear meter
MW:	Megawatt
MWh:	Megawatt hour
MDGs:	Millennium Development Goals
RAP:	Regional Environmental Action Plan
PAF:	Forest Action Plan
PCGES:	Programme Cadre de Gestion Environnementale et Sociale (Environmental and Social Management Framework Programme)
SCPMP:	General Safety and Health Protection Coordination Plan
ESMP:	Environmental and Social Management Plan
PHSS:	Health and Safety Plan
PM:	For the record
PNAE:	Plan National d'Action pour l'Environnement (National Action Plan for the Environment)
PNAE:	Plan National d'Action pour l'Environnement (National Action Plan for the Environment)
PNER:	National Rural Electrification Programme
PNUER:	National Emergency Rural Electrification Programme
PUDC:	Emergency Community Development Program
PUMA:	Emergency Program for the Modernization of Axes and Border Territories
PV :	Photovoltaic
UGP:	Management and Planning Units
V:	Volt

## CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY

### 1.1. Background to the program

The rate of access to electricity is relatively low in Senegal with only 61.7% at the national level (Base 2017)<sup>1</sup>. There is a great disparity between urban and rural populations with access rates of 90% in urban areas (Base 2016) and 42.3% in rural areas (Base 2018)<sup>2</sup>.

Faced with this situation, the Government of Senegal had initiated a National Rural Electrification Programme (PNER). The objective was to achieve a rural electrification rate of 60% at the national level by 2017, with a minimum of 30% per department, with a view to achieving universal access to electricity by 2025, one of the priorities of the Emerging Senegal Plan (ESP).

The PNER will therefore make it possible to considerably improve the overall service level of the energy sector and consequently improve the living conditions of rural populations (Mr. M. FAYE, November 2016).

To achieve this, the Government of Senegal, through the Agence Sénégalaise d'Électrification Rurale (ASER), has just drawn up an Operational Plan for universal access in 2025 at a total investment cost of about one billion euros.

This programme is structured around the following components:

- Electrification of villages by extension of the Medium Voltage network
- Electrification of remote villages by off-grid systems (mini-grids and Individual Solar Systems).

In order to mobilize the financial resources required for PNER implementation, the State intends to seek the support of development partners and the private sector to complete the overall financing of the programme.

To this end, a programme for the electrification of 1000 villages by solar mini-grids has been developed by ASER, which with co-financing from the State of Senegal (including KfW)/Green Climate Fund (GCF)/BOAD, intends to mobilize the resources required for the installation of mini-grids in 1,000 villages remote from Senegal's interconnected grid and provide access to electricity for about 340,000 inhabitants living in rural areas affected by poverty and long left behind by previous rural electrification programmes based mainly on the extension of the grid.

### 1.2. Rationale for the Environmental and Social Impact Assessment (ESIA)

With regard to the directives of the West African Development Bank (BOAD), technical and financial partner of ASER in the implementation of this program targeting 1,000 villages and with a view to sustainability, it appeared necessary to ensure that environmental issues are properly taken into account during the implementation of this project. Thus, this Environmental and Social Impact Assessment (ESIA) has been defined to ensure that all environmental and social management measures related to the implementation of the project are taken.

This ESIA will be the frame of reference for all the interventions of ASER at the level of the target area.

<sup>1</sup> World Bank database

<sup>2</sup> ASER database

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### **1.3. Goals of the ESIA**

The main objectives targeted by the environmental and social strategy are, inter alia, to:

- ensure that socio-environmental concerns are taken into account in the project implementation process ;
- analyse the environmental and social compliance of planned activities with the regulations;
- propose operational solutions / measures for environmental and social management that are technically feasible and socially acceptable by including them in an action plan;
- propose a global strategy for environmental and social management of project interventions and acquisitions;
- identify the risks associated with the execution of the project;
- define the mitigation and management procedures and measures to be implemented.

### **1.4. Methodological approach**

The mission was organized according to the methodological approach approved by ASER.

This methodological approach followed during the conduct of this strategic environmental assessment is articulated around the following steps:

#### **1.4.1. Preparatory activities prior to the start of the mission**

At the beginning, it was carried out with ASER, an exhaustive framing of the mission by a review of the methodology of the Consultant, its adjustment to integrate any omission to take care of the concerns of ASER and its technical and financial partners.

#### **1.4.2. Collection of basic data**

The collection of baseline data provided an accurate understanding of the initial environmental structure of the intervention area in order to understand the environmental and social issues of the project on the biophysical and human environment.

This activity was carried out through four (04) main tasks:

- review of the technical and formulation studies of the project;
- the meeting with the structures / technical services;
- consultation with administrative authorities;
- the consultation of the populations.

#### **1.4.3. Literature review**

The documentary research was carried out in all the structures which, by virtue of their activities, are potentially holders of information likely to be of interest to the project.

One of the objectives of the literature review was:

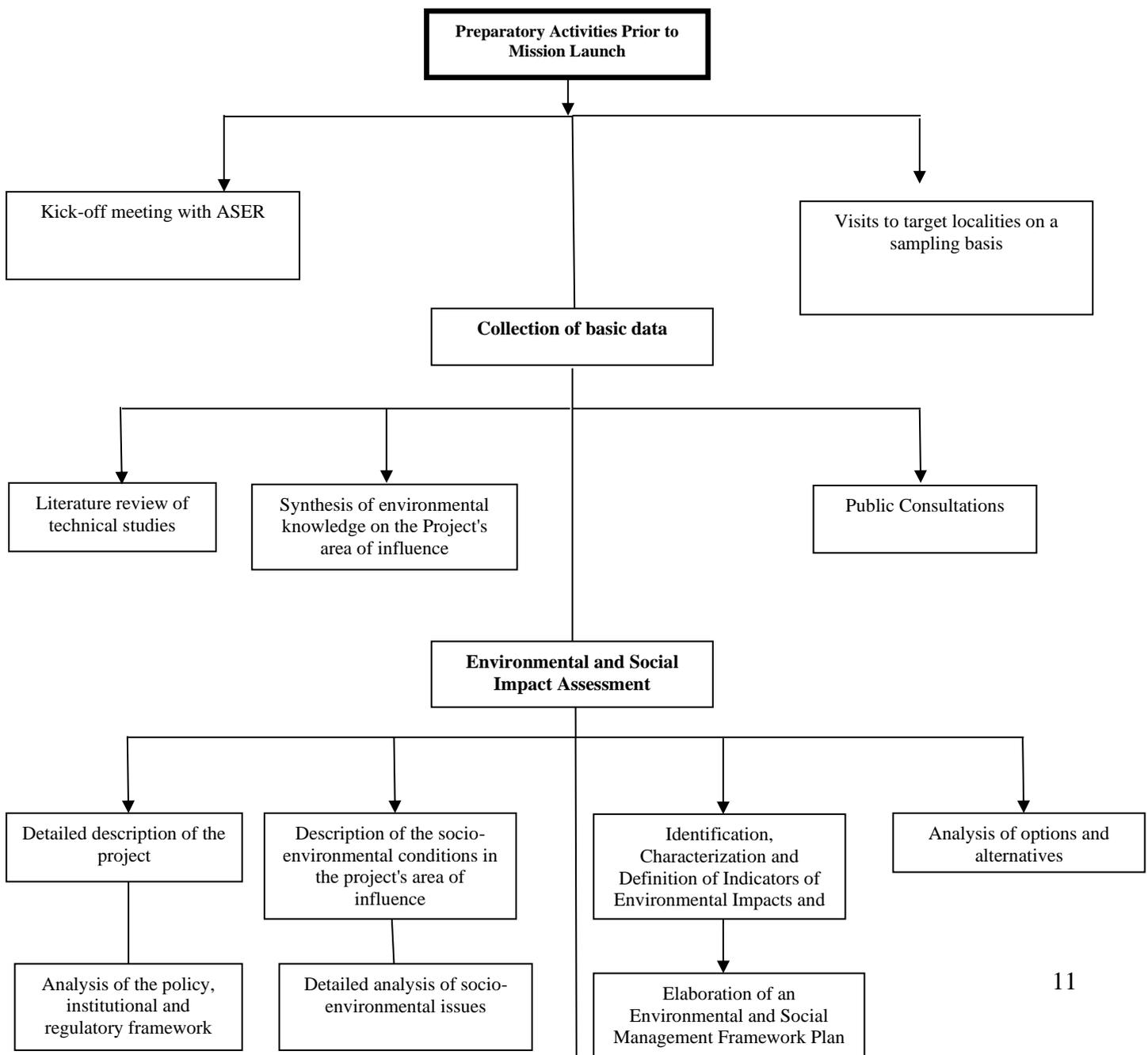
- on the one hand, to review Senegalese policy on environmental management and protection, and;
- on the other hand, to review the institutional, political, legislative and regulatory framework governing the sector (electricity and similar activities, etc.).

#### 1.4.4. Processing and analysis of collected information

The collected information has been processed in different ways:

- criticism, amendments;
- triangulation and prioritization
- translation of certain information as required into figures, figures, images (maps, photos etc.).

**Figure 1 : Methodological approach**



	<p style="text-align: center;"><b>RURAL ELECTRIFICATION PROJECT IN SEVEN (07) ADMINISTRATIVE REGIONS IN SENEGAL</b> (<i>Kaffrine, Kaolack, Fatick, Kolda, Kédougou, Tambacounda et Saint-Louis</i>) <b>Environmental and Social Impact Assessment Report</b> (<i>Preliminary Report</i>)</p>	<p style="text-align: center;">Provisional version 22/03/2020</p>
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## **CHAPTER 2: PROJECT DESCRIPTION**

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### **2.1. Context**

Senegal is committed to achieving universal access to electricity by 2025 to address the socio-economic objectives defined by the Senegal Emerging Plan by 2035. In this context, the rural environment remains the major challenge to achieving this objective given the inequalities observed to date in terms of access to electricity services.

In order to achieve this objective of universal access to electricity, the State of Senegal, through ASER, envisages:

- the qualification of villages and associated design studies;
- the supply and delivery of components;
- the installation and commissioning of equipment.
- operation of the service by private operators (cessionnaires).

### **2.2. Project goals**

#### **2.2.1. Overall goal**

The overall objective is to supply 1,000 villages with electricity independently of the national grid.

#### **2.2.2. Sectorial goals**

The sectorial goals are :

- the supply of electricity to 1,000 villages;
- the installation of an estimated power of 32 MW peak;
- the installation of photovoltaic surface area;
- the promotion of renewable energy with a saving of thousands of tons of CO2 equivalent;
- the installation of public lampposts;
- the installation of power lines, residential equipment (sockets, lamps, TGBT, etc.).

### **2.3. Project description**

#### **2.3.1. Location**

The project sites are located in 1,000 villages spread over seven (07) administrative regions of Senegal. They are Kaffrine, Kaolack, Fatick (in the Centre), Kolda, Kédougou, Tambacounda (in the South) and Saint-Louis (in the North). The location of the villages concerned is shown on the map below (Figure 2).

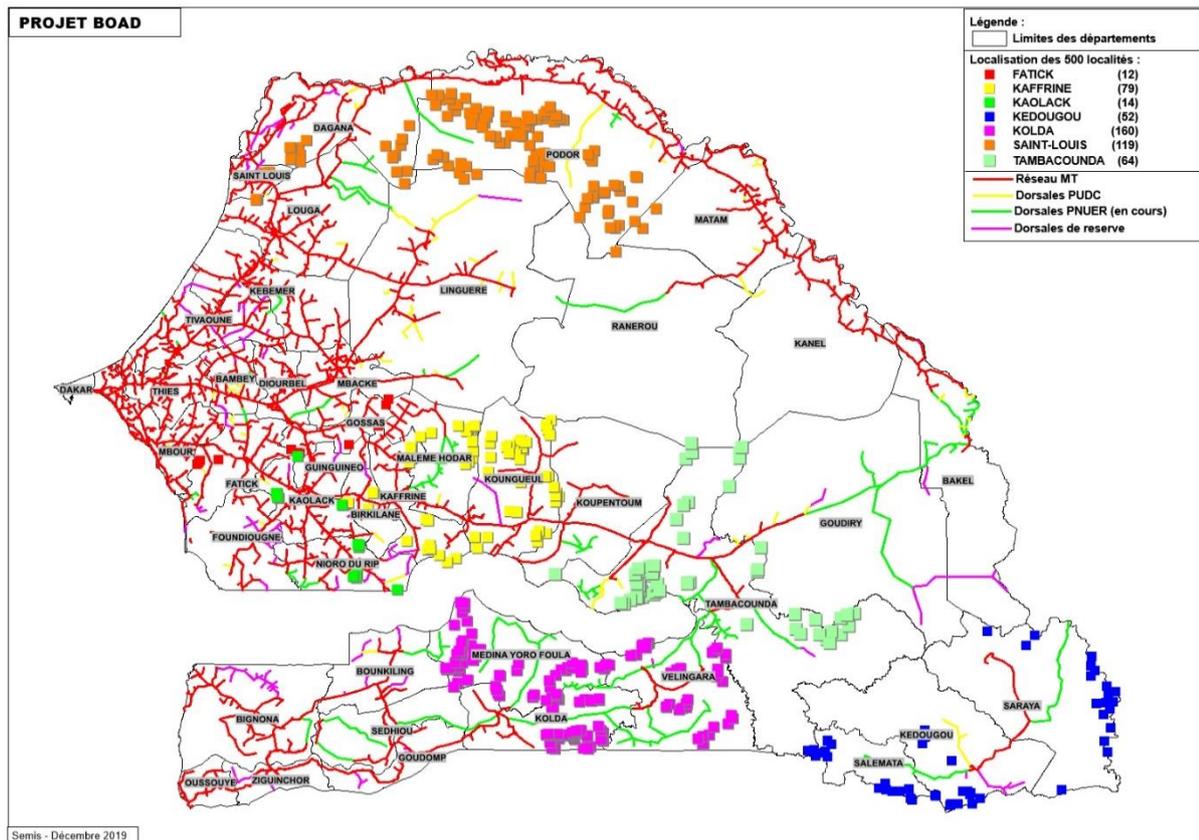


Figure 2 : Map of the targeted villages

### 2.3.2. Technical components of the project

The project will include the implementation of photovoltaic modules that will represent an electrical power of around 22 MW peak, making it possible to supply more than 340,000 inhabitants living in the 1,000 villages concerned.

The project consists of the installation, in each village concerned, of a solar power plant (15 to 45 kWp) associated with low-voltage (LV) lines, public lighting and residential equipment. Generators could also be provided to cover some of the needs of the villages concerned in case of total blackout of the solar photovoltaic (PV) system.

The principle is to provide the users of each village (domestic, professional, community uses and public lighting among others) with a PV solar power plant with a three-phase power supply. For this purpose, the technical solutions to be studied and implemented at the level of the beneficiary localities, including all the necessary equipment requirements for rural electrification are defined below:

- Kit 1: 15 kWp - 48 V 1545 AhC10, which can occupy a floor area of 650 m<sup>2</sup>, aims to cover 30 connection points ;
- Kit 2: 23 kWp - 48 V 2317 AhC10, which can occupy a floor area of 1000 m<sup>2</sup>, is intended to cover 45 connection points;
- Kit 3: 30 kWp - 48V 2x1545 AhC10, which can occupy a floor area of 1500 m<sup>2</sup>, is designed to cover 60 connection points;

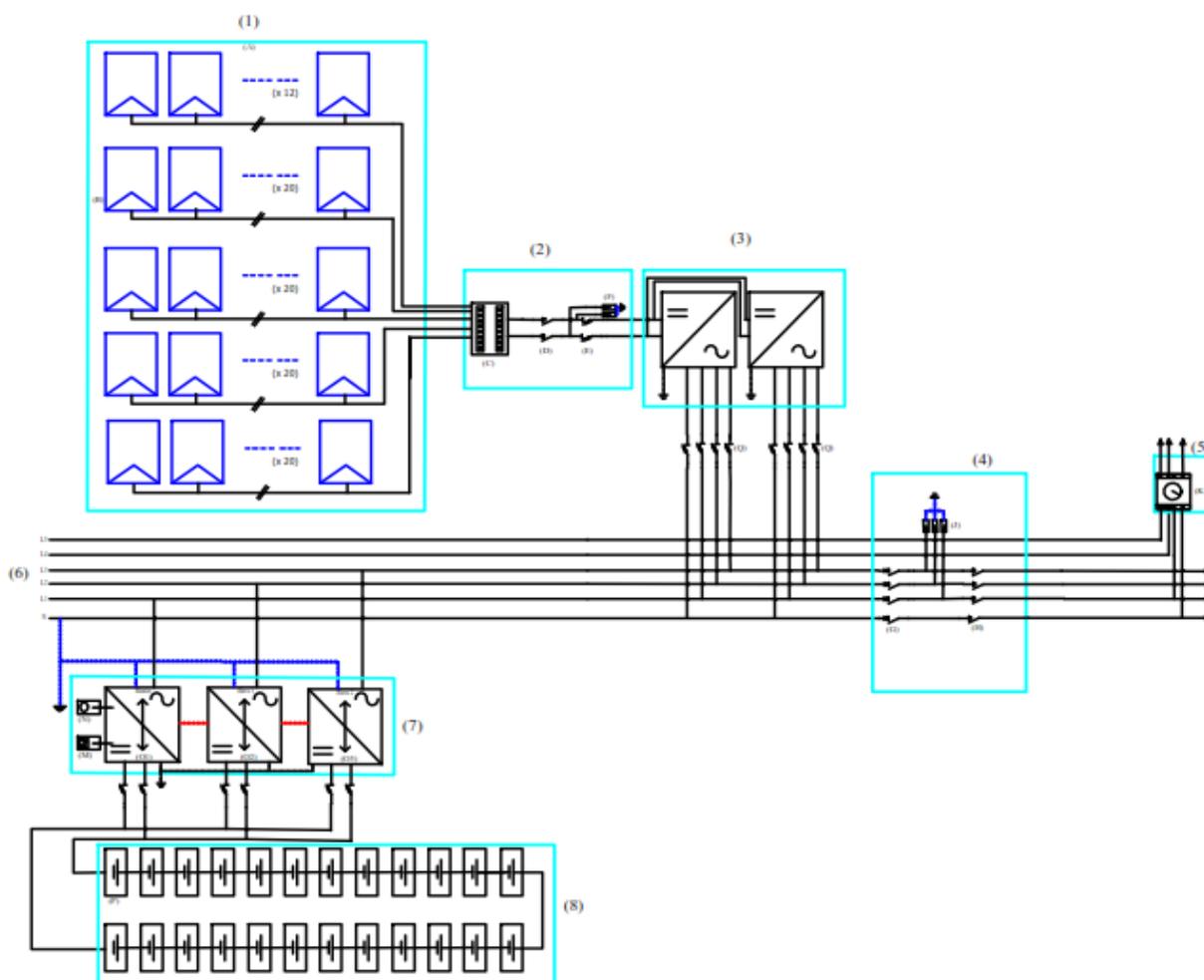
- Kit 4: 45kWp - 48V 2x2317 AhC10, which can occupy a floor area of 1800 m<sup>2</sup>, to cover 90 connection points.

**NB:** the type of PV solar power plant to be installed in a locality will depend on the daily load profile of the locality and will be based on the corresponding range among those described above.

Each Kit will consist of the following main technical elements:

- a photovoltaic field that allows the direct transformation of sunlight into electrical energy;
- photovoltaic inverters;
- charging inverters;
- an energy storage system using lead-acid batteries;
- a technical room containing the various components of the PV solar power plant;
- a protection and remote control and monitoring device.

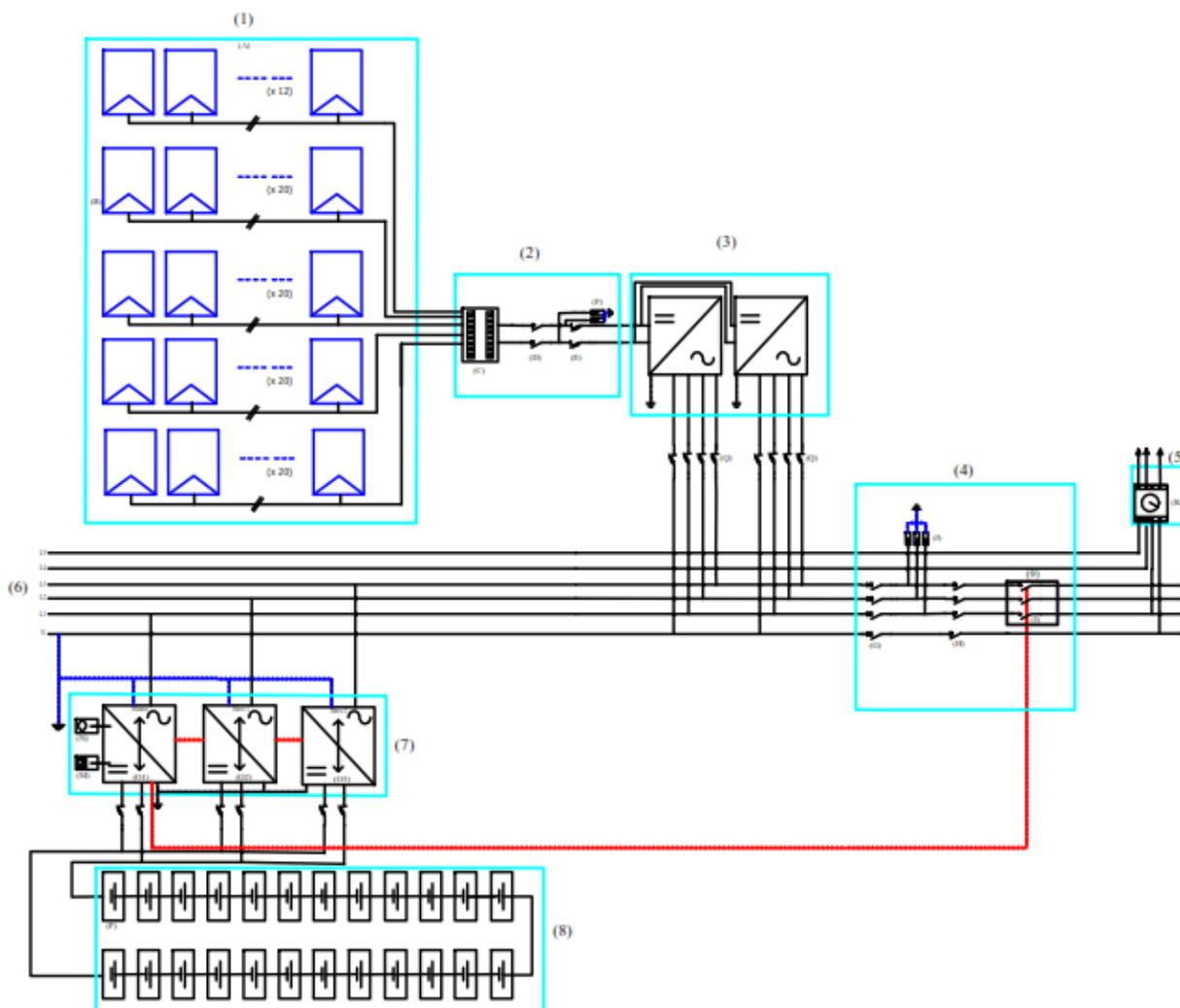
Each photovoltaic field will be connected to an energy conversion station via inverters, a storage park for the electrical energy produced via batteries according to the single-line diagrams below.



**Figure 3:** Provisional single-line diagram of the electrical installation of Kit 2 (23 kWp) without load-shedding system

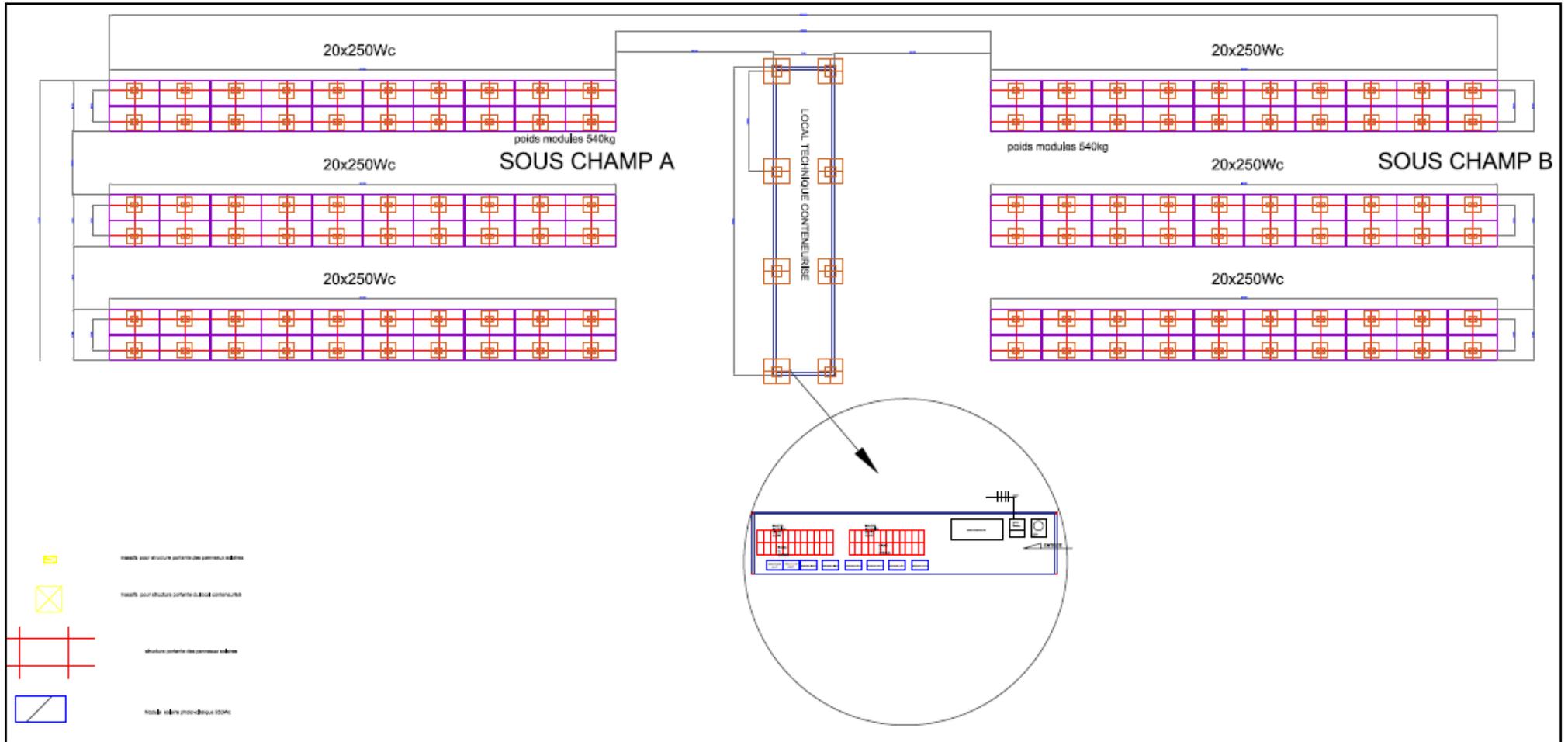
**Legend:**

(1)	PV fields of 92 panels
(2)	Direct current (DC) box
(3)	2 12 kW PV inverters or equivalent
(4)	Alternating current (AC) box
(5)	EP box (public lighting)
(6)	Low voltage (LV) distribution cable
(7)	3 6 kW charger inverters or equivalent (1 Master inverter + 2 esclave inverters)
(8)	Battery bank



**Figure 4:** Provisional single-line diagram of the electrical installation of Kit 2 (23 kWp) with load-shedding system

Figure 5 below gives details of the implementation of the various technical elements of the project. A more detailed description of these elements is presented in the following sections.



**Figure 5:** Layout plan of the 30 kWp PV solar power plant

### 2.3.3. Photovoltaic field

The solar collectors installed in each of the villages concerned will consist of photovoltaic cells that convert sunlight directly into electrical energy. At this precise stage of the project, the choice is made for polycrystalline modules with a unitary power of 250 Wp. This technology makes it possible to have :

- a good energy efficiency of around 21%;
- a long service life (between 20 and 30 years);
- a stability of production.

The number of branches, the number of panels for each branch, the size of the panels, etc. are defined in the synoptics corresponding to each Kit.

The modules will be assembled in sub-fields in the form of tables and oriented due south with a given inclination to optimize the power on a given surface at this latitude. Being in a rural environment, the lower part of the tables will be located at a minimum height of 50 cm from the ground allowing the regular removal of the herbaceous layer especially during the summer period.

The panels will be anchored on concrete blocks or pile foundations. The photo below shows an example of the layout of a PV module sub-field.



**Photo 1 :** Example of the arrangement of a sub-field of PV modules

#### 2.3.1.1. Photovoltaic inverters

Photovoltaic inverters, whose role is to convert the direct current produced by the solar panels into alternating current identical to that of the LV grid (400-230 V-50 Hz) of the locality concerned, make it possible to:

- supply energy directly to consumers and;
- provide energy to recharge the battery bank.

It is a unidirectional type solar inverter, i.e. it converts the energy from the PV field (direct current) into three-phase alternating current which it injects directly into the LV grid. These inverters will be equipped with high-performance decoupling protection systems in case of malfunction.



**Photo 2:** Example of Sunny Island 48VDC/230VAC photovoltaic inverters

### ***2.3.1.2. Charging inverters***

The inverter-chargers are bi-directional, i.e. during the day they collect excess energy from the LV grid to charge the battery bank. In addition, in the evening or during periods of low sunshine, they convert the energy stored in the battery bank into alternating current (AC).

In the event of low battery charge levels, an optional load-shedding system is available to guarantee the supply of priority needs such as public lighting and sanitary facilities during the night and to ensure better battery cycling. To ensure this function, which underlies an imbalance between phases, a set of three (03) single-phase inverters in clustered and configured in Master/Slave mode is provided. This configuration will allow, in the event of a low battery charge level, to disconnect the two non-priority phases and to supply only the priority loads.



**Photo 3:** Example of single-phase inverters

#### ***2.3.1.3. Energy storage installation***

The project includes the installation and operation of a battery farm to store part of the electricity produced by the photovoltaic fields. The total capacity of the battery is sized to meet the daily energy demand. The nominal voltage of the battery bank is 48V for the different Solar Kits.

Energy storage is achieved by means of batteries of lead-acid technology. These batteries will be gelled, completely closed and delivered without external acid; retention tanks will also be supplied and installed for the battery bank.



**Figure 6:** Examples of batteries

#### ***2.3.1.4. Technical room***

The various related components of the PV fields will be housed in a secure, insulated, air-conditioned and watertight technical room. The room will be installed in compliance with the

minimum distances between electrical units to ensure good ventilation according to the manufacturer's specifications under the climatic conditions of the site. At this stage of the project, two (02) options are available for the technical room:

- Masonry technical room: a concrete slab, on which will be erected four plastered breezeblock walls and a roof structure. This masonry technical room will be equipped with a metal door, high and low ventilation grilles with anti-insects/dust filter;
- Pre-assembled container: these 10 to 20 foot prefabricated containers would then be positioned on the concrete slab (see Photo 5).

In both (02) cases, the enclosures will be in fenced spaces dedicated to the solar equipment. As the batteries will be closed, in both cases, no interior partitioning is planned. At this stage of the project, the dimensions of the technical room are 6.5 ml long by 2.5 to 2.8 ml wide and 2.5 ml high. The room will be able to house the DC cabinets, inverter-chargers, cables and cable trays, protective covers, DC/AC inverters, AC cabinets, a wall shelf, sockets and lighting with door contactors and SCADA.

The technical room will remain locked and not accessible to the public for security reasons. Only ASER dealers and representatives will be authorized to enter the building, having been previously trained in the procedures, safety instructions and functionalities of the different components of the power plant and its technical room.

Any generators will be placed outside under wire mesh shelters.



**Photo 5:** Example of a masonry technical room



**Photo 6 :** Example of a containerized technical room

### **2.3.1.5. Protection and control devices**

The project integrates the protection of the PV module fields, inverters and their accessories against weather conditions of atmospheric origin (lightning, rain, etc.), short circuits, electrical overloads, etc. The project also integrates the protection of the PV module fields, inverters and their accessories against weather conditions of atmospheric origin (lightning, rain, etc.), short circuits, electrical overloads, etc. The project integrates the protection of the PV module fields, inverters and their accessories against weather conditions of atmospheric origin (lightning, rain, etc.), short circuits, electrical overloads, etc. Protection of people against direct and indirect contact will also be ensured. To this end, the protective devices chosen at this stage of the project include:

- Anti-return diodes on the photovoltaic modules;
- DC-side circuit breakers (DC circuit breakers);
- surge arresters on the DC side;
- the DC connection box;
- DC switch-disconnectors;
- Photovoltaic inverters equipped with high-performance decoupling protection systems with automatic disconnection from the grid which intervenes when the inverter's voltage or frequency operating range is exceeded;
- circuit breakers for general protection of photovoltaic inverters;
- circuit breakers for the supply of the various needs (auxiliaries of the solar power plant, the technical room, the EP box, the LV grid of the locality concerned and the battery charging inverters);
- surge arresters on the AC side;
- the AC connection box;
- the equipotentiality of all conductive elements and metallic masses (excluding the battery pack) by means of earth connections.

In addition, the solar power plant will be continuously monitored by a monitoring system that will allow a maximum amount of information from the inverter-charger and the PV inverter to be fed back to the operator. The inverters are of the communicating type and integrate remote

monitoring functionality. This monitoring will be done via GPRS or Ethernet protocol. However, if the telephone network is not available at the recipient location, a system that allows the operator to retrieve the plant data regularly on site can be considered (USB stick, SD card, etc.).

#### 2.3.4. Consistency of the work

The construction and installation of PV modules and electrical works include:

- Preparation of the host site including various operations prior to the installation of the solar power plant structures, including: clearing of areas with high vegetation, civil engineering works with the installation of the fence, digging of trenches for the underground electricity network and installation of concrete blocks;
- assembly of the photovoltaic structures, connection of the low-voltage networks and installation of the modules;
- the electrical connection of the various installations, including the wiring of the modules, inverters, batteries, connection boxes, the necessary earthing, etc.;
- the work of connecting the PE network and installing the lanterns.

#### 2.4. Phasing of the project

The project will be spread over different phases as shown in the table below.

**Table 1:** Different phases of the project

Phase	Activities
<b>Surveys &amp; Engineering</b>	Awareness-raising of stakeholders, identification of areas, studies and calculation notes per village.
<b>Validation and control of components</b>	Approval of calculation notes for confirmation of designs and orders electrical components
<b>Civil Engineering</b>	Perimeter fences, laying of slabs and studs for metal structures; laying of foundations for posts and public lighting.
<b>Electrification</b>	Installation of solar panels, cables, electronic components up to powering up.
<b>Reception of the works by village</b>	Mechanical completion (Cold Commissioning), energization (Hot Commissioning), provisional and final acceptance by village.



## 2.5. Main stakeholders

<b>PROJECT OWNERSHIP</b>	<b>CONTACT PERSON</b>	<b>EMAIL</b>
Senegalese Rural Electrification Agency (ASER)	Ousmane Fall SARR	ofsarr@yahoo.com
<b>ENVIRONMENTAL &amp; SOCIAL ASSESSMENT</b>	<b>CONTACT PERSON</b>	<b>EMAIL</b>
PYRAMIDE Environnemental Consultants	Momar SOW, Gérant	pyramideconsultants@gmail.com
<b>FUNDERS</b>	<b>CONTACT PERSON</b>	<b>EMAIL</b>
West African Development Bank (BOAD)		



## CHAPTER 3: POLITICAL, LEGAL AND INSTITUTIONAL CONTEXT

This chapter provides a summary analysis of the regulatory and legislative aspects of the project's activities in terms of environmental and social management. To this end, an exhaustive review of Senegal's environmental policy has been carried out.

This framework takes into account the international texts ratified by Senegal.

### 3.1. Analysis of the national policy and strategic framework

Reference documents	Link with the project
<b>Constitutional Act No. 2016-10 of 05 April 2016 revising the Constitution</b>	Article 8 of the Constitution guarantees the right to a healthy environment to every citizen.
<b>Senegal's third poverty reduction strategy (2013-17), now called: National Economic and Social Development Strategy</b>	<p>It is based on the lessons learned from the second strategy (PRSP-II 2006-2010) and constitutes the reference framework for the formulation of policies, sectoral development plans and investment programmes. The poverty reduction strategy sets, among other objectives, the doubling of per capita income within the framework of strong, balanced and better distributed growth.</p> <p>The poverty reduction strategy, based on redistributed growth and meeting the basic needs of the poor, is based on the following priorities:</p> <ul style="list-style-type: none"> <li>- doubling per capita income in the context of strong, balanced and better distributed growth;</li> <li>- generalizing access to essential social services by accelerating the establishment of basic infrastructure;</li> <li>- eradicating all forms of exclusion and achieving gender equality.</li> </ul> <p>In this context, the interventions of the Project are in line with this strategy which aims at universal access to electricity in 2025 to address the socio-economic objectives defined by the Senegal Emerging Plan for 2035.</p>
<b>The Sectoral Policy Letter on Spatial Planning, Decentralization and Local Development</b>	This Sector Policy Letter sets out the guidelines of the State of Senegal in terms of land use planning, decentralisation and local development.
<b>The Energy Sector Development Policy Letter (LPDSE)</b>	In February 2008, the Government of Senegal adopted an Energy Sector Development Policy Letter (LPDSE), which aimed, among other objectives, to achieve by 2012 average electrification rates of 75% at the national level, 50% in rural areas and 95% in urban areas, and an independence rate in commercial energy of at least 20% by



Reference documents	Link with the project
	<p>2020 (compared to 4% in 2004), thanks to the contribution of biofuels, hydroelectricity and renewable energies.</p> <p>The energy strategy adopted by the Government was based on a number of main lines, including the development and exploitation of national energy potential, diversification of the energy mix, acceleration of access to electricity and restructuring of the electricity sub-sector with a view to greater efficiency and judicious involvement of the private sector.</p> <p>Its sectoral vision is oriented towards an energy sector characterized by a perfect availability of energy at the lowest possible cost and guaranteeing universal access to modern energy services while respecting the principles of social and environmental acceptability. The interventions of this project remain consistent with this new orientation of the State of Senegal.</p>
<p><b>The National Action Plan on Energy Efficiency (PANEE)</b></p>	<p>This plan was developed within the framework of ECOWAS actions, through the ECOWAS Centre for Renewable Energy and Energy Efficiency (CEREE/C) for the promotion of energy management. Indeed, the priorities of this regional policy, defined under the impetus of ECREE, concern the following areas:</p> <ul style="list-style-type: none"> <li>- efficient lighting ;</li> <li>- Achieving high performance in the distribution of electricity;</li> <li>- development of standards and labelling of energy-consuming equipment;</li> <li>- Mobilisation of funding to mitigate negative environmental externalities;</li> <li>- sustainable, affordable and safe cooking.</li> </ul> <p>The Action Plan was therefore built on the basis of these priorities and in line with the country's situation.</p> <p>It was established between 2015 and 2016 with the prior involvement, in an inclusive approach, of all entities with prerogatives in the field of energy efficiency. It revolves around the following target objectives:</p> <ul style="list-style-type: none"> <li>- efficient lighting;</li> <li>- high-performance electricity distribution;</li> <li>- energy efficiency standards and labelling;</li> <li>- energy efficiency in buildings;</li> <li>- energy efficiency in industries.</li> </ul>
<p><b>The Emerging Senegal Plan</b></p>	<p>The Project is aligned with the government's areas of intervention. Indeed, the improvement of the living conditions of the populations is one of the priorities of the Plan Sénégal Emergent (PSE), the reference document of the economic and social policy of the</p>

Reference documents	Link with the project
	country. Moreover, the Emerging Senegal Plan (PSE), the reference framework for all sectoral interventions, has enshrined universal access to energy as a priority.

### 3.2. Sectoral environmental policy framework

Reference documents	Link with the project
<b>The National Sustainable Development Strategy (March 2005 version)</b>	The National Strategy for Sustainable Development (NSSD) whose objective is rather to make the policies, strategies and programmes currently being implemented coherent on the one hand, and on the other hand, to promote a better synergy between the various actions carried out by trying to identify and take charge of the interfaces or areas of competition". This strategy is broken down into six main thrusts or orientations, including the promotion of balanced and harmonious development (thrust 3) and the strengthening of measures and actions that can contribute to the achievement of the Millennium Development Goals (MDGs) (axis 6).
<b>The National Implementation Strategy for the Convention on Climate Change</b>	The national strategy for the implementation of the climate change convention aims to integrate the climate change dimension into economic and social development policy. The NIS is a tool that should respond to the country's development needs while integrating the climate change dimension.
<b>The National Action Plan to Combat Desertification</b>	Desertification and the degradation of natural resources are, in several areas of Senegal, the most acute environmental problems. The PAN/LCD, which is a major component of the National Action Plan for the Environment (PNAE), focuses on restoration, reforestation, capacity building and awareness raising on natural resource management.
<b>Environment and Sustainable Development Sector Policy Letter (2016-2020)</b>	It is in line with the search for conditions for sustainable economic and social development compatible with environmentally sound management/exploitation of natural resources and the environment.
<b>Senegal's Forest Policy (2005-2025)</b>	Senegal's Forest Policy follows on from the Forest Action Plan (FAP), which itself is an extension of the 1982 Master Plan for Forest Development. It provides for several actions, including the creation of a coordination framework for natural resource management, the rationalization of forest exploitation and the empowerment of local communities in the management of local forest resources.

<b>Reference documents</b>	<b>Link with the project</b>
<b>The Biodiversity Conservation Strategy and Action Plan</b>	<p>As part of the implementation of the international convention on the conservation of biodiversity, Senegal has developed a strategy and an action plan for the conservation of biodiversity. The strategy strongly emphasizes the need to preserve biodiversity sites by reducing the risks of destruction of natural habitats and disturbance of ecosystems.</p>
<b>The National Adaptation Programme of Action (NAPA)</b>	<p>It represents a set of defined priority activities that will need to address Climate Change.</p> <p>The NAPA document provides an overview of the content of the activities to be undertaken to address urgent and immediate needs and concerns for adaptation to the adverse effects of climate change.</p> <p>Also, the interventions of the Project will have to be in coherence with the axes defined in the NAPA.</p>
<b>Regional Environmental Action Plan (REAP)</b>	<p>In Senegal, the management of natural resources and environmental protection, as transferred competences, give local authorities prerogatives in the planning and management of the resources of their terroirs. It is on this basis that the Ministry of the Environment and Nature Protection (now the Ministry of Environment and Sustainable Development) initiated in 2006 the development of Regional Environmental Action Plans (PAER), which should contribute to a better consideration of the concerns of regional stakeholders in environmental planning.</p> <p>The planning of the interventions of the Project will have to take into account the orientations defined in the PAER.</p>

### 3.3. National laws and regulations applicable to the project

#### 3.3.1. Sectoral laws and regulations

Reference documents	Relevant content for the project
<b>Water Code</b>	<p>Law No. 81-13 of 4 March 1981 on the Water Code provides, inter alia, for the regime of water resource use (surface and ground water), the protection of water quality; the various uses of water and the order of priority of use.</p> <p>This law governs the regime of non-maritime waters, including the waters of deltas, estuaries and mangroves, as well as the regime of hydraulic works. In order to ensure effective protection of this resource, the public domain regime is used. Indeed, the public domain is characterized by its inalienability and imprescriptibility. Water abstraction is subject either to a regime of authorization or to a regime of declaration.</p> <p>Title II of the Code is devoted to the qualitative protection of water and provides for measures to combat water pollution and its regeneration by setting standards to be observed for uses, by determining the facts likely to pollute water and the administrative means of combating pollution. Priority is always given to human consumption (article 75).</p> <p>For water resources, activities must comply with the Water Code (particularly the resource use regime, water quality protection and the various uses and their prioritization) and with standard NS-05-061 on wastewater discharges into the various receiving environments.</p>
<b>Law No. 8371 of 5 July 1983 on the Hygiene Code</b>	<p><b>Article L 8:</b> Without prejudice to the special provisions resulting from the texts governing enterprises exploiting mineral waters, any person who offers water to the public for human consumption, whether in return for payment or free of charge and in any form whatsoever, is required to ensure that such water is fit for consumption.</p>

Reference documents	Relevant content for the project
	<p><b>Article L.30:</b> "The premises and surroundings of industrial and commercial establishments must not be unhealthy. Wastewater must be disposed of in accordance with the regulations in force and specific to each industry. ».</p>
<p><b>Act No. 64-46 on the national domain</b></p>	<p>It extends to all lands not classified in the public domain, not registered or whose ownership has not been transcribed in the mortgage agreement on the date of coming into force of the D.N.A. (s. 4). The NDA has classified the national domain into four (04) categories:</p> <ul style="list-style-type: none"> <li>- urban areas</li> <li>- classified areas which are subject to specific regulations</li> <li>- the zones of terroirs located in the CR</li> <li>- the frontier areas.</li> </ul> <p>Decree 72-1288 of 27 October 1972 amended by Decrees 80-1051 of 14 October 1980 and 86-445 of 10 April 1986 places the management of land in the "terroirs" areas under the responsibility of the Rural Communities. The latter then have a very important decision-making power over land allocations and withdrawals, and the installation of dwellings and campsites in terroir zones.</p> <p>The main criterion for land allocation is based on the territoriality and development capacity of the applicant. In principle, land may not be the subject of any commercial transaction (sale or lease).</p> <p>The State may register land and allocate it to third parties for public purposes.</p> <p>The Rural Community may in principle decide to abandon land for lack of development, use not in conformity with the regulations or because it needs to be revised. Also, the notion of development mentioned in these texts generally refers to the cultivation of land, without taking into account pastoralism and forestry.</p> <p>For the success of the project, it will be necessary to take into account the sensitivity of the land question in the planning of these activities.</p>

Reference documents	Relevant content for the project
<b>Law n° 76-67 of 02 July 1976</b>	<p>It relates to expropriation in the public interest and other land transactions in the public interest.</p>
<b>Decree No. 80-268 of 10 March 1980 on the organization of livestock routes and the conditions of use of pastures.</b>	<p>The presence of stockbreeders in the activity zones imposes the respect of decree n° 80-268 of 10 March 1980 relating to the organization of the cattle routes and fixing the conditions of use of the pastures in particular the provisions relating to the access to the zones of pastures, to the water points.</p>
<b>Law n° 2013-10 of 28 December 2013 on the general code of local authorities</b>	<p><b>Article 304:</b> The Department is given the following powers:</p> <ul style="list-style-type: none"> <li>- the creation and management of forests, protected areas and natural sites of departmental interest;</li> <li>- the issuance of hunting amodiation authorizations, after advice from the municipal council;</li> <li>- the management of continental waters, excluding watercourses of national or international status;</li> <li>- the elaboration and implementation of departmental plans of environmental action, emergency intervention and risk prevention;</li> <li>- the construction of firebreaks and early ignition, as part of the fight against bushfires;</li> <li>- the development and implementation of local environmental action plans;</li> <li>- the protection of ground and surface water;</li> <li>- the distribution of forest exploitation quotas among the communes;</li> <li>- fire-fighting and nature protection;</li> <li>- authorisation to clear land after obtaining the opinion of the municipal council concerned;</li> <li>- the issuing of cutting and felling permits..</li> </ul> <p><b>Section 2: competence of the municipality</b></p> <p><b>Article 305</b> The following powers are conferred to the municipality:</p>

Reference documents	Relevant content for the project
	<ul style="list-style-type: none"> <li>- - the management of the forests of terroirs ;</li> <li>- - the management of natural sites of local interest;</li> <li>- - the creation and management of communal woodlands and protected areas;</li> <li>- - the creation of artificial ponds and hillside reservoirs, particularly for agricultural purposes;</li> <li>- - reforestation operations;</li> <li>- - the elaboration of communal action plans for the environment;</li> <li>- - waste management and the fight against insalubrity;</li> <li>- - defence of the environment.</li> </ul>
<b>Forestry Code</b>	It consists of a legislative part (Law No. 2018-25 of 12 November 2018) and a regulatory part (Decree No. 2019-111 of 16 January 2019). The work may require the clearing of wooded areas. The regulatory part of the Forestry Code allows for the obtaining of a clearing permit.
<b>Act No. 71-12 of 25 September 1971 establishing the rules governing historic monuments and the rules governing excavations and discoveries and Decree No. 73-746 of 8 August 1973 implementing Act No. 71-12 of 25 January 1971 determines the policy for the preservation of such sites.</b>	Certain activities may affect sites classified as historical heritage sites, as well as cultural remains may be discovered during the work.
<b>Hunting and Wildlife Protection Code</b>	Law No. 86-04 on the Hunting and Wildlife Protection Code (Legislative Part) prohibits poaching and makes the exercise of hunting activities subject to obtaining a permit issued by the competent authority.
<b>Act No. 97-17 of 1 December 1997 on the Labour Code</b>	It lays down working conditions, in particular as regards working hours, which must not exceed 40 hours a week, night work, contracts for women and children and weekly rest, which is compulsory. The text also deals with health and safety in the workplace and indicates the measures that all activities must take to ensure

Reference documents	Relevant content for the project
	<p>health and safety, which guarantee a healthy environment and safe working conditions. New decrees have been added to the existing system:</p> <ul style="list-style-type: none"> <li>- Decree No. 2006-1249 of 15 November 2006 establishing minimum health and safety requirements for temporary or mobile work sites;</li> <li>- Decree n° 2006-1250 of 15 November 2006 relating to the circulation of vehicles and machines within companies;</li> <li>- Decree No. 2006-1251 of 15 November 2006 on work equipment;</li> <li>- Decree No. 2006-1252 of 15 November 2006 setting the minimum requirements for the prevention of certain physical environmental factors;</li> <li>- Decree No. 2006-1253 of 15 November 2006 instituting an occupational medical inspectorate and establishing its powers;</li> <li>- Decree No. 2006-1254 of 15 November 2006 on the manual handling of loads;</li> <li>- Decree No. 2006-1256 of 15 November 2006 establishing the obligations of employers in terms of safety at work;</li> <li>- Decree n° 2006-1257 of 15 November 2006 setting the minimum requirements for protection against chemical risks;</li> <li>- Decree n° 2006-1258 of 15 November 2006 fixing the missions and rules of organisation and functioning of the occupational medicine services;</li> <li>- Decree No. 2006-1260 of 15 November 2006 on the conditions of ventilation and sanitation of workplaces;</li> <li>- Decree No. 2006-1261 of 15 November 2006 establishing general health and safety measures in establishments of all kinds.</li> </ul>
<b>Law No. 2008-43 of 20 August 2008 on the Town Planning Code</b>	<p>The town planning code sets out town planning forecasts and rules which are expressed by:</p> <ul style="list-style-type: none"> <li>- the master plans of development and town planning;</li> <li>- the master plans for town planning;</li> <li>- detailed urban plans;</li> </ul>

Reference documents	Relevant content for the project
	<p>- subdivision plans.</p> <p>The urban master plan and the detailed urban plan determine the distribution and organization of the land into zones, the layout of communication routes, sites reserved for public services, installations of general interest, open spaces, construction rules and servitudes, land use conditions, etc. The urban master plan and the detailed urban plan determine the distribution and organization of the land into zones, the layout of communication routes, sites reserved for public services, installations of general interest, open spaces, construction rules and servitudes, land use conditions, etc. The urban master plan and the detailed urban plan determine the distribution and organization of the land into zones. The Code is supplemented by Decree No. 2009-1450 of 30 December 2009 on the regulatory part of the Urban Planning Code.</p> <p>The realization of the activities of the project must, therefore, comply with the rules relating to the act of building enacted, on the one hand, by the Urban Planning Code (law n°2008-43 of 20 August 2008 on the Urban Planning Code and its application decree n°2009-1450 of 30 December 2009) and, on the other hand, by the Building Code (law n°2009-23 of 08 July 2009 on the Building Code and its application decree n°2010-99 of 27 January 2010).</p> <p>More specifically:</p> <ul style="list-style-type: none"> <li>✓ <b>Article 67</b> stipulates that the act of building is preceded by the issuance of a town planning certificate which indicates whether the parcel of land applied for can be assigned to construction or used for carrying out an operation.</li> </ul> <p>If the constructability of the land or the possibility of carrying out a given operation is subject to the opinion of the Ministry in charge of historic monuments or classified sites, the town planning certificate expressly reserves this right.</p> <ul style="list-style-type: none"> <li>✓ <b>Article 68</b> stipulates that no one may undertake, without administrative authorization, construction of any kind or make changes to existing constructions on the territory of the communes, as well as in the agglomerations designated by order of the Minister in charge of town planning. This obligation is imposed on public services and public service concessionaires of the State, departments and communes, as well as on private persons.</li> </ul>

Reference documents	Relevant content for the project
	<p>Throughout the national territory, establishments open to the public, industrial or classified establishments as well as constructions to be built on a classified site are subject to building permits. In addition, establishments open to the public must obtain a permit to open to the public once it has been ascertained that the installations and facilities comply with safety regulations.</p> <ul style="list-style-type: none"> <li>✓ <b>Article 73</b> recalls that the declaration of completion of the work certified as being in conformity by the construction supervisor or contractor is compulsory. This declaration is addressed to the competent authority, which ensures that the work complies with the provisions of the building permit. If the works are deemed to comply with these provisions, a certificate of conformity is issued, otherwise it is refused, and the authority may order any necessary modifications.</li> </ul>
<b>traffic regulations</b>	<p>The Ministerial Order N°60 MIETTMI-DTT dated 11 January 2005 setting the limits of the loading height of public road transport vehicles fixed the number of seats allowed according to the type of vehicle and specified the way in which the loading of vehicles must be distributed.</p>

	<b>RURAL ELECTRIFICATION PROJECT IN SEVEN (07) ADMINISTRATIVE REGIONS IN SENEGAL (Kaffrine, Kaolack, Fatick, Kolda, Kédougou, Tambacounda et Saint-Louis)</b> <b>Environmental and Social Impact Assessment Report</b> <i>(Preliminary Report)</i>	<b>Provisional version</b> <b>22/03/2020</b>
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### **3.3.1.1. Land legislation**

#### *3.3.1.1.1. Access to land: Senegal's land tenure system*

In considering the various texts relating to land, the administrative classification of land highlights three main categories:

1. the national domain with its sub-categories (urban areas, terroir areas, classified areas, pioneer areas);
2. the State domain, which is subdivided into private and public domains of the State;
3. the private domain of private individuals consisting of land registered in the name of private individuals.

Each domain is subject to a specific mode of administration and management and the management and administration powers are either entrusted to the central administration and its technical services or to the local authorities.

#### **❖ National domain**

According to article 1 of Act No. 64-46 of 17 June 1964, the national domain consists of all land not classified in the public domain, not registered and whose ownership has not been transcribed to the mortgage registry on the date of entry into force of the Act. It is divided into four categories of land, namely:

##### **→ Urban zones**

The urban areas consist of the lands of the national domain located on the territory of the municipalities and urban planning groups provided for by the applicable legislation (Art. 5).

##### **→ Classified zones**

Classified areas are made up of forest areas or protected areas which have been classified in accordance with the conditions laid down in the special regulations applicable to them (Art. 6).

##### **→ The zones of the territories**

The zone of the terroirs corresponds, in principle, to the land that is regularly exploited for rural habitat, cultivation or breeding at the date of publication of the law, (Art.7 al.2).

##### **→ Pioneer areas**

Frontier zones correspond to other lands (Art. para.2). All lands in the Delta were classified as pioneer zones from 1965 (Decree No. 65-443) to 1987, when they were downgraded and returned to the "terroirs" zone (Decree No. 87-720 of 4 June 1987).

#### **❖ State domain**

The domain of the State is governed by Law No. 76-66 of 2 July 1976 on the Code of the Domain of the State and Decree No. 81-557 of 21 May 1981 on its application in respect of its private domain. The domain of the State includes the public domain and the private domain, Art 1ér) and according to Article 9, the public domain is inalienable and imprescriptible.

The public domain of the State consists of all property which, by reason of its nature or the destination given to it, is not subject to private appropriation (Art.2.al.2). The public domain is either natural (sea - continental shelf; navigable watercourses, floating and/or not, lakes, etc.)

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or artificial (right of way of roads, railways, hydraulic works, communication routes of all kinds, etc.) (Art.5 and 6).

❖ **The private domain of individuals**

This area is governed by the decree of 26 July 1932 on the reorganization of the land tenure system in West Africa and the law n° 2011-07 of 30 March 2011 on the land tenure system. The law refers to this land as "land that has been registered in the name of a person other than the State".

3.3.1.1.2. *The different types of administrative titles to land in Senegalese law*

→ *Land title*

In accordance with Article 42 of Law No. 2011-07 of 30 March 2011 on the system of land ownership, "The land title is final and unassailable, it constitutes the sole point of departure for all real rights existing on the property at the time of registration". Indeed, the land title is a definitive and unattackable right of ownership over a building (whether built or not). It guarantees the owner a permanent and lasting occupation. The land title is a property right in its own right. Its holder can sell, bequeath or mortgage it..

→ *deliberation*

It is the act by which the local community assigns a portion of the national domain to a person for development. The assignee has a right of use and enjoyment but cannot transfer the property. However, in the event of death, his heirs may, within three months of his death, submit a request for reallocation in order to continue to develop the land.

→ *the license to be an occupant (article 37 code of the state domain)*

The licence to occupy is a dismemberment of the right of ownership which gives the holder the right to use it, to reap the benefits (e.g. rents) but not to sell it. It can be transferred under certain conditions.

→ *the ordinary lease*

It is defined by Article 38 of the State Domain Code which stipulates that: The ordinary lease confers on the lessee a right of enjoyment for a period not exceeding eighteen years. The leaseholder has the right to use it, to reap its fruits but not to sell it. However, he may assign the lease for the remaining period and in accordance with the conditions of allotment.

→ *the emphyteutic lease (article 39 code of the state domain)*

The emphyteutic lease confers on the lessee, or emphyteutic lessee, a real right that may be hypothecated for a term of between eighteen and fifty years. The right to the lease may be transferred for the remaining period and according to the conditions of the original contract.

→ *The mortgage*

It is defined by Article 190 of the OHADA Uniform Act on Security Interests as "*the allocation of a specific or determinable property belonging to the grantor as security for one or more claims, present or future, provided that they are specific or determinable*". It is a security constituted on an immovable property which is assigned to the payment of a debt. A hypothec

confers on the creditor a preferential right and a right of pursuit enabling him to pursue the sale of the property in whatever hand it may be found. The mortgage may be sold or inherited..

*3.3.1.1.3. Summaries of the different types of administrative titles and their associated rights*

Administrative titles	Recognized rights
Land Title	Right to assign, sell, bequeath, mortgage.
Deliberation	Right to occupy and exploit.
Licence to occupy	Right of use and right to enjoy the fruits. Right to transfer under certain conditions.
Ordinary lease	Right to transfer, bequeath (for the period of the lease and according to the conditions of the original contract).
Emphyteutic lease	Right to assign, bequeath, mortgage (for the period of the lease and according to the conditions of the original contract)
Mortgage	Right of preference, right of resale, right to sell, right to bequeath.

The provisions contained in these land regulations will have to be taken into account by ASER in the project implementation process, particularly in the case of land acquisition for the implementation of the infrastructures.

***3.3.1.2. Texts relating to civil protection***

The planned projects are considered to be Classified Environmental Protection Facilities (CEPA) within the meaning of environmental regulations. To this end, they will have to comply with the directives of the regulations on civil protection, including the implementation of safety measures governing their operation. The various texts applicable in this context are listed below:

- Ministerial Order n°18050 M.INT of December 9, 1965 fixing the instructions applicable to the fire surveillance service in establishments open to the public;
- Inter-ministerial Order n°5945 M.INT-P.C. of 14 May 1969 instituting safety rules against the risks of fire and panic in establishments open to the public;
- Inter-ministerial Order n° 41321 M.INT. -P.C. of 24 September 1979 establishing the context of the security register ;
- Inter-ministerial Order No. 4862 of 14 July 1999 making it compulsory to draw up an Internal Operation Plan (POI) in certain classified establishments and a Special Intervention Plan (PPI) in local authorities with classified installations within their territorial perimeter that are subject to the drawing up of a POI;
- Decree no. 99-172 of 4 March 1999 repealing and replacing Decree no. 93-1288 of 17 November 1993 adopting the National Relief Organization Plan.

### 3.3.2. Provisions contained in the Environmental Code and applicable to "ASER" interventions

The table below highlights all the relevant provisions of the Environmental Code applicable to the project.

Topic	Reference	Regulated area
<b>Waste            management</b>	<b>Chapter III</b>  Article L 31	Any person who produces or holds waste must dispose of or recycle it himself or have it disposed of or recycled by companies approved by the Minister responsible for the environment. Failing this, he must hand over the waste to the local authority or to any company approved by the State with a view to its management. This company, or the local authority itself, may sign contracts with the producers or holders of waste with a view to its elimination or recycling. Recycling must always be done according to Senegalese standards.
	Article L 37	The disposal of waste by producing and/or processing structures must be carried out under the authorisation and supervision of the Ministry in charge of the environment, which sets requirements.
	Article L 41	The dumping, incineration or disposal by any process whatsoever of waste in continental, maritime or fluvio-maritime waters under Senegalese jurisdiction is prohibited.
	Article L 42	Burial in the subsoil may be carried out only after authorization has been obtained from the Minister responsible for the environment, who lays down technical requirements and special rules to be observed.
<b>Environmental            Impact            Assessment</b>	<b>Chapter V</b>  Article L 48	Any development project or activity likely to harm the environment, as well as policies, plans, programs, regional and sectoral studies will be subject to an environmental assessment.
	Article L 49	The impact study forms part of an already existing authorisation, approval or concession granting procedure; the main actors involved in the environmental impact study procedure are the promoter and the competent authorities. The impact study is drawn up at the expense of the developer and submitted by him to the Ministry in charge of the environment, which issues a certificate of authorization after technical advice from the Department of the Environment and Classified Establishments.

Topic	Reference	Regulated area
<b>Protection and            enhancement of            receiving            environments</b>	<b>Title III / Chapter I</b>  Article L 60	The characteristics of the waste water discharged must enable the receiving environments consisting of continental and marine waters to meet the objectives assigned to them.
	Article L 61	The Minister in charge of the Environment, in relation with the Ministers concerned, determines the substances whose discharge, dumping, deposit, dumping or introduction in a direct or indirect manner into continental and marine waters must be either prohibited or subject to prior authorization by the environment and sanitation authorities.
	Article L 63	All direct or indirect spills, discharges, discharges, deposits or deposits of any kind likely to cause or increase the pollution of continental waters and/or sea waters within territorial limits shall be prohibited.
	Article L 70	Any infringement of the laws and regulations relating to the prevention of water pollution shall be punished in accordance with the penal provisions in force. Any person guilty of an offence, which damages a natural environment and by the same token damages the interests of the users of this environment, shall be civilly liable, under the conditions laid down by law, for the prejudice thus caused to any other natural or legal person.
	Article L 71	The civil liability of the polluter is engaged, in the absence of any fault, when the establishment at the origin of the damage caused is an establishment "at risk".

### 3.3.3. Hygiene, Health and Safety Requirements

Designation	Requirements	Reference documents
<b>Risk assessment and prevention</b>		
<b>General obligation of the employer</b>	<p>The employer must ensure that in the workplace, the machinery, equipment, substances and work processes under his control do not present a risk to the health and safety of workers. Prevention in this area is ensured by :</p> <ul style="list-style-type: none"> <li>- technical measures applied to new installations or processes when they are designed or installed, or by technical additions to existing installations or processes;</li> <li>- by work organization measures.</li> </ul> <p>Employers shall also be required to have an assessment of the risks to safety and health at work, including those concerning groups of workers at particular risk;</p> <p>To take the necessary measures to ensure the promotion of the safety and health of workers, including activities for the prevention of occupational risks, (...), and the establishment of the necessary organization and means.</p>	<p><b>Act No. 97-17 of 1 December 1997 on the Labour Code</b></p> <p><b>Title 11: Health and Safety</b></p> <p><b>Art. L.171 and Art. L.172</b></p> <p><b>Decrees No. 2006-1256 of 15 November 2006 setting out the obligations of employers with regard to sécurité at work</b></p> <p><b>Chapter II: Obligations of Employers</b></p>
<b>Training, information, awareness-raising and communication</b>		
<b>Employer obligation</b>	<p>All workers must:</p> <ul style="list-style-type: none"> <li>- be fully informed of the occupational risks existing in the workplace;</li> <li>- receive adequate instructions as to the means available and the action to be taken to prevent and protect themselves against such risks.</li> </ul> <p>Such information and instructions must be brought to the attention of workers in such a way and in such a form as to enable each worker to have a good minimum general training in health and safety.</p> <p>Occupational health and safety measures as well as training or information measures shall be the sole responsibility of the employer.</p> <p>The employer must instruct the workers in the provisions concerning the protection of work equipment. He must inform them in an appropriate manner of the precautions to be taken, in particular the use of guards and protective devices, as well as the safety functions of the control devices.</p>	<p><b>Act No. 97-17 of 1 December 1997 on the Labour Code</b></p> <p><b>Title 11: Health and Safety</b></p> <p><b>Art. L.177</b></p> <p><b>Decree No. 2006-1251 of 15 November 2006 on work equipment</b></p> <p><b>Chapter III - Means of prevention</b></p>

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Designation	Requirements	Reference documents
	<p>He must ensure that this information has been understood by the workers. He must repeat it as many times as necessary.</p>	
<b>HSS.2.1. Obligations of the employer (continued)</b>	<p>Workers or their representatives shall have the right to submit any proposals likely to ensure their protection in the workplace (...).</p> <p>The employer shall submit an annual report on health and safety in the undertaking to the health and safety committee and the occupational safety service and to the workers' representatives.</p> <p>Obligations for the employer to :</p> <ul style="list-style-type: none"> <li>- take the necessary measures to ensure the promotion of the safety and health of workers, including (...) information and training activities, as well as the establishment of the necessary organization and means;</li> <li>- keep a register of accidents at work;</li> <li>- to draw up reports on accidents at work suffered by workers;</li> <li>- take appropriate measures to ensure that workers and/or their representatives in the establishment receive all necessary information concerning health and safety risks, as well as protection and prevention measures and activities concerning both the establishment in general and each type of work station and/or function in particular;</li> <li>- take appropriate measures to ensure that workers from external establishments working in its establishment receive adequate information concerning the prevention of occupational risks.</li> </ul> <p>The employer is required to notify the Labor and Social Security Inspector of any occupational accident that occurs or any occupational disease found in the undertaking. This notice shall be given without delay by any emergency means in the event of a fatal accident.</p>	<b>Act No. 97-17 of 1 December 1997 on the Labour Code          Title 11: Health and Safety          Decree No. 2006-1256 of 15 November 2006 setting out the obligations of employers with regard to safety at work          Chapter II: Obligations of Employers</b>
<b>Medical monitoring of staff</b>		
<b>Organization</b>	<p>Personnel in factories and other industrial enterprises must undergo periodic medical examinations in accordance with the regulations in force.</p> <p>The organization, operation and financing of occupational health services are the responsibility of the employer. The occupational health service is organized as follows:</p> <ul style="list-style-type: none"> <li>- either in the form of an establishment occupational health service when the number of workers in the establishment is at least equal to four hundred (400);</li> <li>- or in the form of an inter-company occupational health service where the establishment employs less than one hundred (100) workers.</li> </ul>	<b>Act No. 83-71 of 5 July 1983 on the Hygiene Code          Title I: Public health rules          Chapter 6: Hygiene rules for industrial installations          Decree No. 2006-1258 of 15 November 2006 establishing the missions and rules for the organisation and operation of occupational medicine services.</b>

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<b>Designation</b>	<b>Requirements</b>	<b>Reference documents</b>
	<p>Establishments with a workforce of between 100 and 400 workers shall, after consulting the Health and Safety Committee or, failing that, the staff representatives, organize an occupational health service in accordance with one of the forms defined below.</p> <p>Building and public works undertakings and undertakings whose activity is seasonal or occasional are required to organize a service of their own or to join an inter-company occupational medicine service, regardless of the number of workers they employ.</p>	<b>Chapter I: General Provisions</b> <b>Art. 2 and Art. 3</b>
<b>Occupational medical services and first aid</b>	<p>Establishments must recruit nursing staff with a State diploma or, failing that, holders of diplomas awarded by a school recognized by the State with a licence to practise issued under the conditions laid down by the health legislation in force. Such nursing staff shall be recruited with the agreement of the chief medical officer of the company or inter-company occupational medical service. The mission of the nursing staff is to assist the occupational physician in all his activities.</p> <p>A medical secretary (e) must assist each occupational physician in the occupational medical services. He or she is recruited with the agreement of the chief medical officer of the occupational medical service of the enterprise or inter-company medical service.</p> <p>In every workshop, building site or service where dangerous work is carried out, a member of staff must have received the necessary instruction to give first aid in an emergency. Where the activity of an establishment involves day and night work and in the absence of a nurse, or where the number of nurses (...) does not permit the permanent presence of such personnel, the employer shall, after consulting the occupational physician, take the necessary steps to provide first aid in the event of an accident. These provisions shall be recorded in a document held at the disposal of the Labour and Social Security Inspector in the jurisdiction.</p>	<b>Decree No. 2006-1258 of 15 November 2006 setting the missions and rules of organization and operation of occupational medicine services.</b>  <b>Chapter II: Occupational health service personnel</b> <b>Art. 26; Art. 27; Art. 28; Art. 29</b>
<b>Missions of the occupational health services</b>	<p>The occupational physician is the adviser to the head of the undertaking or his representative, the employees, representatives, staff, social services with regard to, in particular :</p> <ul style="list-style-type: none"> <li>- the improvement of living and working conditions in the establishment;</li> <li>- the adaptation of workstations, techniques and work rhythms to human physiology;</li> <li>- the protection of employees against all nuisances and, in particular, against the risks of accidents at work or the use of dangerous products;</li> <li>- the general hygiene of the establishment;</li> <li>- health prevention and education in the context of the establishment, in relation to the professional activity.</li> </ul>	<b>Decree No. 2006-1258 of 15 November 2006 establishing the missions and rules for the organisation and operation of occupational medicine services.</b> <b>Chapter V. - Missions of the occupational health services</b> <b>Art. 30; Art. 31; Art. 32; Art. 33</b>

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Designation	Requirements	Reference documents
	<p>In order to carry out these tasks, the occupational physician carries out actions in the working environment and conducts medical examinations.</p> <p>Every year, the occupational physician draws up a plan of activities in the workplace, based on the state and health needs of the employees, which covers the risks, positions and working conditions in the establishment(s) for which he is responsible. This plan shall include the studies to be undertaken and the minimum number and frequency of workplace visits.</p> <p>The occupational physician must be associated :</p> <ul style="list-style-type: none"> <li>- in the training of the first-aid workers mentioned above;</li> <li>- the study of any new production technique.</li> <li>- He is consulted on projects:</li> <li>- new construction or development projects</li> <li>- of equipment modifications.</li> </ul> <p>In order to prevent occupational risks, he shall be informed :</p> <ul style="list-style-type: none"> <li>- of the nature and composition of the products used by the workers as well as their conditions of use;</li> <li>- the results of all measurements and analyses carried out in relation to health and safety in the undertaking.</li> </ul>	
<b>Medical check-ups</b>	<p>Every employee shall undergo a medical examination before being hired or, at the latest, before the expiry of the probationary period following his hiring. An employee who is subject to special medical surveillance (...) must undergo this examination before being recruited. The purpose of the medical examination is :</p> <ol style="list-style-type: none"> <li>1. to ensure that the worker is medically fit for the post to which the head of establishment intends to assign him or her</li> <li>2. to investigate whether the employee is not suffering from a condition that is dangerous to other workers</li> <li>3. to propose any adjustments to the post or assignment to other posts.</li> </ol> <p>All employees must undergo a medical examination at least once a year to ensure that they remain fit for the position they occupy. This examination shall include at least :</p>	<p><b>Decree No. 2006-1258 of 15 November 2006 establishing the missions and rules for the organization and operation of occupational medicine services.</b></p> <p><b>Chapter V. - Missions of the occupational health services</b>  <b>Art. 38; Art. 40</b></p>

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	<ul style="list-style-type: none"> <li>- a clinical examination;</li> <li>- a chest X-ray examination by a radiologist and a urine analysis for albumin and sugar.</li> </ul> <p>The occupational physician exercises special medical supervision over :</p> <ul style="list-style-type: none"> <li>- employees assigned to certain work involving special requirements or risks, determined by order of the Minister of Labor;</li> <li>- Employees who have just changed their type of activity or migrant workers for a period of 18 months from the date of their new assignment;</li> <li>- Disabled persons, pregnant women, mothers of children under two years of age, workers under 18 years of age..</li> </ul>	
<b>Medical documents</b>	<p>The occupational physician is required to report cases of occupational diseases of which he becomes aware to the Labor Inspectorate and the Social Security Fund of the jurisdiction, as well as to the Labor Medical Inspectorate. The occupational physician is also required to declare occupational diseases that are not included in the list of compensable occupational diseases.</p>	<p><b>Decree No. 2006-1258 of 15 November 2006 laying down the missions and rules for the organization and operation of occupational medicine services Art. 47</b></p>
<b>Emergency Management</b>		
<b>First-aid, fire-fighting and evacuation measures</b>	<p>Obligations for the employer to :</p> <ul style="list-style-type: none"> <li>- take the necessary measures with regard to first aid, fire-fighting and evacuation of workers, adapted to the nature of the activities and the size of the establishment and taking into account the presence of other persons;</li> <li>- organize the necessary relations with external services, in particular as regards first aid, emergency medical assistance, rescue and fire-fighting.</li> </ul> <p>In particular, the employer must designate the workers responsible for first aid, fire-fighting and evacuation of workers to carry out these measures.</p> <p>These workers must be trained, be in sufficient number and have at their disposal adequate equipment, taking into account the size and specific risks of the establishment.</p>	<p><b>Decree No. 2006-1261 of 15 November 2006 establishing general health and safety measures in establishments of all kinds.</b>  <b>Chapter VII: First aid, firefighting, evacuation of workers, serious and immediate danger</b></p>
<b>Emergency plan</b>	<p>The operator of any classified installation subject to authorization is required to draw up an internal operation plan (IOP) to ensure that the competent authorities and neighboring populations are alerted in the event of a disaster or threat of disaster, that personnel are evacuated and that the causes of the disaster are identified. The internal operation plan must be approved by the Ministry of the Interior and the</p>	<p><b>Law n°2001 - 01 of 15 January 2001 on the environment code Title II: Prevention and control of pollution and nuisances</b></p>

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<b>Designation</b>	<b>Requirements</b>	<b>Reference documents</b>
	<p>Ministries responsible for the environment, industry, public health and any other relevant ministries. These Ministries periodically ensure the effective implementation of the requirements set out in the internal operation plan and the good condition of the equipment assigned to these tasks.</p> <p>The IOP defines the organizational measures, the methods of intervention and the means to be implemented to protect the personnel, the population and the environment against technological accidents; it establishes the emergency measures to be taken by the establishment before the intervention of external assistance. The IOP is drawn up at the expense of the operator, by legal or natural persons with the required skills in this field.</p> <p>The IOP is drawn up on the basis of a study of the hazards of the establishment, including the analysis of the various possible accident scenarios and their most penalizing consequences. Exercises for the application of the POI will be carried out at least twice a year to check its reliability, in order to fill in any gaps if necessary, and also to train the establishment's personnel and allow its continuous and regular updating.</p>	<p><b>Chapter VI: Drawing up an emergency plan</b> <b>Art. L 56</b> <b>Ministerial Order No. 4862 of 14 July 1999 making it compulsory to draw up an internal operations plan (POI) in certain classified establishments.</b> <b>Art. 2; 3; 5; 9</b></p>
<b>Good Hygiene Practices in the Workplace</b>		
<b>General hygiene measures in establishments of all kinds</b>	<p>The premises and surroundings of industrial and commercial establishments must not be unhealthy. Wastewater must be disposed of in accordance with the regulations in force and specific to each industry.</p> <p>Combustion fires, incinerators and incineration plants must not give off dust, odors or smoke that could pollute the atmosphere.</p>	<p><b>Act No. 83-71 of 5 July 1983 on the Hygiene Code</b> <b>Title I: Public health rules</b> <b>Chapter 6: Hygiene rules for industrial installations</b></p>
<b>General hygiene measures in establishments of all kinds (continued)</b>	<p>Workplaces and premises allocated to workers must be sheltered:</p> <ul style="list-style-type: none"> <li>- from water, in particular from rain or flooding;</li> <li>- from any fumes or sources of infection from, inter alia, pits, cesspools, sumps, drains or standing water.</li> </ul> <p>Workplaces must be kept in good order and free from clutter.... Waste must be disposed of as it is generated. If waste is stored, it must be stored away from work stations and not present a risk to workers. Workplaces and the furniture and equipment therein must be kept in a constant state of cleanliness</p>	<p><b>Decree No. 2006-1261 of 15 November 2006 establishing general health and safety measures in all types of establishments</b> <b>Chapter II: Quality of places and work stations</b> <b>Chapter III: Cleanliness and good order in the workplace</b></p>
<b>General hygiene measures in establishments of all kinds</b>	<p>The employer must provide each entitled person with two (02) complete sets of working clothes per year, adapted to the size of the latter, free of charge. Each outfit, consisting of at least two pieces, skirt or trousers and a shirt, must be adapted to the worker's size and activity. The employer must provide each worker with the appropriate means, in particular soap and detergents, to keep his working clothes clean. Workers</p>	<p><b>Decree No. 2006-1261 of 15 November 2006 establishing general health and safety measures in all types of establishments</b></p>

<b>Designation</b>	<b>Requirements</b>	<b>Reference documents</b>
<b>(continued and concluded)</b>	<p>assigned to work equipment or in the vicinity of work equipment must be provided with appropriate clothing.</p> <p>The employer must provide changing rooms for his staff, where all or part of them are normally required to change their clothing in order to carry out their work. Changing rooms must comply with the following requirements :</p> <ul style="list-style-type: none"> <li>- be sufficiently spacious and properly ventilated;</li> <li>- the clothing stored in them must be able to dry;</li> <li>- their floors and walls must be easy to clean. They must be kept in a constant state of cleanliness and be cleaned at least once a day;</li> <li>- separate changing rooms must be provided for male and female workers;</li> <li>- be provided with a sufficient number of seats, such as benches, chairs, stools and individual lockers. Such lockers shall be designed to hold personal effects, excluding easily perishable goods or foodstuffs. For this purpose, they must be equipped with a clothes-hanger rail and a sufficient number of hangers. They must be locked or padlocked.</li> </ul> <p>The head of establishment must provide toilets on the premises of the undertaking, production plant or department which can be used properly and hygienically by workers. Men's and women's toilets must be separate.</p>	<b>Chapter IV: Services and premises available to employees</b>
<b>Physical environmental factors (lighting, thermal environment, noise, atmospheric environment)</b>		
<b>Lighting conditions</b>	<p>Workplaces and workplaces for workers must have, as far as possible, sufficient natural light and must be equipped with adequate artificial (electric) lighting to ensure that workers have good eyesight. General lighting must be supplemented, where necessary, by localized lighting at each workstation.</p> <p>The lighting of work areas must be designed and provided in such a way that the level of lighting is appropriate to the nature and precision of the work to be performed and does not cause visual fatigue and the resulting illnesses.</p> <p>Workplaces must have emergency lighting. It must provide ambient lighting of such a kind as to ensure good visibility of obstacles and, if necessary, evacuation of persons in the event of accidental interruption of normal lighting. This emergency lighting must guarantee an illumination level of at least five lux (5 lux). The lighting devices must be properly cleaned and maintained.</p>	<b>Decree No. 2006-1252 of 15 November 2006 establishing the minimum requirements for the prevention of certain physical environmental factors, establishing the Labor Code. Chapter II: Lighting</b>
<b>Noise at workstations</b>	<p>The level of exposure to noise must be as low as possible and must remain within an intensity limit which is not likely to damage the health of workers, in particular their hearing.</p>	<b>Decree No. 2006-1252 of 15 November 2006 establishing the minimum requirements for the prevention of certain physical</b>

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Designation	Requirements	Reference documents
	<p>The daily noise exposure level received by a worker throughout the working day must not exceed 85 dB (A).</p>	<p><b>environmental factors, establishing the Labor Code. Chapter VI: Noise</b></p>
<b>Personal Protective Equipment (PPE)</b>		
<p><b>Accident prevention in the workplace</b></p>	<p>Where the measures taken (...) are not sufficient to guarantee the safety or health of workers, individual protection measures against occupational risks must be implemented. Where these individual protection measures require the use of appropriate equipment by the worker, such equipment shall be provided and maintained by the employer. In this case, no worker shall be allowed to enter his workstation without his personal protective equipment.</p> <p>If, for technical reasons, the implementation of the collective protection objectives does not ensure satisfactory purification of the air inhaled by employees, personal protective equipment, in this case appropriate respiratory protective devices, must be made available to them. The employer shall take all necessary steps to ensure that such equipment is actually used and maintained in good condition.</p> <p>Where necessary and in all cases where it is technically impossible to eliminate completely the nuisance caused by work equipment, the employer must provide workers with suitable personal protective equipment, in particular :</p> <ul style="list-style-type: none"> <li>- helmets to protect the head against the risks of falling or being thrown;</li> <li>- goggles equipped with suitable eyeglasses and frames to protect the eyes against material projections such as dust, metal particles, splinters, corrosive liquids, etc.;</li> <li>- face shields to protect the face against projections of particles, splinters, incandescent materials;</li> <li>- protective devices to protect against the inhalation of polluting products.</li> <li>- hearing protection devices to protect hearing;</li> <li>- protective gloves for hands and forearms against punctures, cuts, chemical hazards, etc.;</li> <li>- footwear, shoes, boots, to protect feet from crushing or puncture injuries;</li> <li>- safety clothing, protective aprons to protect workers against excessive temperatures, burn and splash hazards.</li> </ul>	<p><b>Act No. 97-17 of 1 December 1997 on the Labour Code Title 11: Health and Safety</b></p> <p><b>Decree No. 2006-1260 of 15 November 2006 on the conditions for ventilating and cleaning workplaces.</b></p> <p><b>Decree No. 2006-1251 of 15 November 2006 on work equipment</b></p>
<b>Work equipment (machine, apparatus, implement, tool or installation used in the work)</b>		
<p><b>Transmission devices</b></p>	<p>Workers must be prevented from reaching dangerous moving parts used for the transmission of movement or energy. These moving parts must be rendered inaccessible by :</p> <ul style="list-style-type: none"> <li>- the structure of the work equipment;</li> <li>- fixed guards, in particular recesses, screens, covers, doors, enclosures.</li> </ul>	<p><b>Decree No. 2006-1251 of 15 November 2006 on work equipment Chapter 2: Transmission devices</b></p>



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Designation	Requirements	Reference documents
	or, failing this, movable guards or other protective devices of equivalent effectiveness.	
<b>Movable elements for performing work</b>	Workers must be prevented from reaching dangerous moving parts used to perform the work.  In all cases, moving parts which are not directly active must be inaccessible.	<b>Decree No. 2006-1251 of 15 November 2006 on work equipment</b> <b>Chapter 3: Moving Parts Used to Perform the Work</b>
<b>Protective devices</b>	It must be possible to remove or open fixed guards only with the aid of tools or keys if they are fitted with locks. Movable guards must be fitted with a locking device. The locking device must :  <ul style="list-style-type: none"> <li>- bring dangerous moving parts to a stop so that workers are not in danger of being injured ;</li> <li>- prevent the dangerous moving parts from being restarted until the guard is in the effective position ;</li> <li>- be at such a distance from the danger zone that workers can work safely.</li> </ul> Where necessary and in all cases where it is technically impossible to completely eliminate the nuisance caused by work equipment, the employer must provide workers with suitable personal protective equipment, in particular fall arrest systems to protect workers against the risks of falling from a height.	<b>Decree No. 2006-1251 of 15 November 2006 on work equipment</b> <b>Chapter 4: Protective Devices</b> <b>Chapter 8: Means of prevention</b>
<b>Actuator</b>	The controls must be arranged in such a way that they cannot be operated unintentionally by the operator or another person.  They must be located outside danger zones and be easily accessible to the operator.	<b>Decree No. 2006-1251 of 15 November 2006 on work equipment</b> <b>Chapter 6: Control unit</b>
<b>Warning, stopping and safety devices</b>	All work equipment must be fitted with control devices suitable for its operation. Where a piece of work equipment comprises several work or intervention stations, each of these stations must be equipped with a stop command. This control must make it possible to stop all or part of the equipment, depending on the risk involved. Each machine must be fitted with as many emergency stop devices as necessary. At least one emergency stop is required. These devices must make it possible to eliminate hazardous situations which are likely to occur or are occurring by stopping the machinery by means of optimum deceleration of its moving parts.	<b>Decree No. 2006-1251 of 15 November 2006 on work equipment</b> <b>Chapter 7: Warning, shutdown and safety devices</b>
<b>Safety measures for equipment and installations used at work</b>	Work equipment must be installed and designed in such a way that workers are not exposed to risks due to splashes of objects, particles or dust connected with the normal use of the work equipment, in particular splashes of chips, incandescent welding products, waste, or resulting in a foreseeable way from the use of the work equipment, in particular splashes of machined parts, tool fragments.	<b>Decree No. 2006-1251 of 15 November 2006 on work equipment</b> <b>Chapter 8: Means of prevention</b>

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Designation	Requirements	Reference documents
	<p>Work equipment supplied with electrical energy must be equipped, installed and maintained in accordance with the provisions relating to the protection of workers against electrical risks, in particular to prevent the risks which may result from direct or indirect contact, overcurrent or electric arcs.</p> <p>The employer must give priority to production methods and work equipment which do not produce vibrations or which produce as little vibration as possible. Failing this, he must take the necessary organizational and technical measures to ensure that vibrations are not likely to endanger the health or safety of workers.</p>	
<b>Storage and handling of flammable liquids</b>		
<b>Requirements applicable to the operation of a hydrocarbon distribution activity from a dangerous, unhealthy or inconvenient installation classified in Class 2</b>	<p>The installation will be located and installed in accordance with the plans attached to the application. Any project to modify these plans must be submitted to the Ministry in charge of the Environment and Classified Establishments before being carried out.</p> <p>It is forbidden to install the installation in the basement and under a room occupied or inhabited by third parties.</p> <p>If the depot is installed in the open air and if it is located less than 6 meters from buildings occupied or inhabited by third parties or from a place containing combustible materials, it shall be separated from them by a wall made of non-combustible materials with a firewall of 2 hours degree and a minimum height of 2 meters (...) The location chosen for the installation of the dispensing appliances shall not be below the tanks supplying them so as to avoid any danger of siphoning.</p> <p>The following minimum distances, measured horizontally from the walls of the dispensing devices, must be observed:</p> <ul style="list-style-type: none"> <li>- 15 meters from the exits of an establishment receiving the public;</li> <li>- 10 meters from a building inhabited or occupied by third parties;</li> <li>- 5 meters from exits and openings (...) from the administrative or technical premises of the installation.</li> </ul> <p>Pump rooms and filling and draining areas must be designed and laid out in such a way that, following an incident, spilled liquids cannot spread or pollute the water. Under no circumstances should oil-laden water be discharged without at least prior settling and separation.</p>	<b>Ministerial Order No. 794 MJEHP- DEEC-DEC dated February 6, 2002 regulating the operation of a hydrocarbon distribution activity from a dangerous, unhealthy or inconvenient facility classified as 2nd class</b>
<b>Requirements for the operation of a 2nd class hydrocarbon deposit</b>	<p>The depot will be located and installed in accordance with the plans attached to the application. Any project to modify these plans must be submitted to the Ministry in charge of the Environment and Classified Establishments prior to its implementation.</p>	<b>Ministerial Order No. 1318 MJEHP- DEEC-DEC dated March 7, 2002 regulating the operation of a hydrocarbon depot classified in the 2nd class</b>

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Designation	Requirements	Reference documents
	<p>The operation of storage depots for particularly flammable liquids (flash point below 0° C) or 1st category liquids (flash point between 0 and 55° C) or alcohols with a strength above 60° GL is prohibited in the basement, in or under a premises inhabited or occupied by third parties (...).</p> <p>If the depot is located less than 6 meters from buildings occupied or inhabited by third parties or from a place containing combustible materials, it shall be separated by a wall made of non-combustible materials with a fire-stop of degree 2 hours and a minimum height of 2 meters.</p>	<b>of dangerous, unhealthy or inconvenient installations</b>
<b>Requirements for the operation of a Class 2 hydrocarbon deposit ( continued)</b>	<p>All measures shall be taken to prevent accidental spillage of liquids into the sewer system during filling or distribution.</p> <p>Any storage of a liquid that may create water or soil pollution must be provided with a retention capacity.</p> <p>The installation leak test will be the subject of a report signed by the installer and sent to the Ministry in charge of the Environment before the tank is put into service.</p> <p>Written instructions must indicate the maintenance procedures, what to do in the event of an accident or incident and how to warn personnel. This instruction must be posted permanently and conspicuously near the depot. (Staff training and information). The operator is required to inform the Department of the Environment and Classified Establishments of any accident or incident within 72 hours.</p>	<b>Ministerial Order No. 1318 MJEHP- DEEC-DEC dated 7 March 2002 regulating the operation of a hydrocarbon deposit classified as 2nd class dangerous, unhealthy or inconvenient installations</b>
<b>Access, internal traffic and signage</b>		
<b>Prevention of risks related to the circulation of vehicles and machinery</b>	<p>The employer must draw up a plan and rules for movement within the company concerning, in particular:</p> <ul style="list-style-type: none"> <li>- vehicles and mobile machinery, whatever their nature, whether motorized or not;</li> <li>- persons who could be endangered by these vehicles or machines.</li> </ul> <p>Traffic lanes and, in particular, traffic, loading and unloading, waiting and parking areas must be of suitable dimensions and must be bordered by a visible line or kerb. They must be provided with signs in accordance with the Highway Code. Failing this, specific signs must be provided in accordance with the provisions relating to safety signs in the workplace.</p> <p>Workers or any other person travelling in risk areas must be protected against the dangers associated with the movement of vehicles and machinery. Where necessary, the employer must make provision for their use :</p> <ul style="list-style-type: none"> <li>- routes and passageways, protected by safety distances and/or physical obstacles;</li> <li>- or completely separate routes and passageways (in particular gates).</li> </ul>	<b>Decree No. 2006-1250 of 15 November 2006 on the circulation of vehicles and machines inside companies.</b>

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<b>Designation</b>	<b>Requirements</b>	<b>Reference documents</b>
	<p>Workers moving in these risk sectors must respect the plan and traffic rules defined by the employer in application of this decree.</p>	
<b>Occupational safety signage measures</b>	<p>Without prejudice to the provisions regulating road traffic, the employer must establish safety signs at the workplace. The signs, as defined in the Annex, must, in particular, warn workers :</p> <ul style="list-style-type: none"> <li>- of the existence of a risk or danger that cannot be totally eliminated;</li> <li>- the prohibition of behaviour likely to present a risk;</li> <li>- of the obligation to adopt a certain behaviour;</li> <li>- the location of fire-fighting equipment;</li> <li>- the location of emergency routes and exits as well as first aid means.</li> </ul> <p>Signs and signals shall consist, in particular, of panels on which are reproduced pictograms, symbols and, where appropriate, written communications. The dimensions and characteristics of these signs, pictograms, symbols and communications shall be such that the message conveyed is easily legible. Workers must be instructed, as often as necessary, in the meaning of the signs put up. The employer must ensure that this information is properly understood.</p>	



### **3.4. BOAD's Environmental and Social Safeguard Policies**

BOAD's environmental and social safeguard policies include operational policies and response procedures.

They were approved in 2001 and revised in 2019 to reflect updated information, improved processes and new knowledge contained in the Integrated Safeguard System (ISS). The adoption and application of the new procedures from 2013 onwards will improve the environmental and social performance of the Bank's operations and thus enhance project results. The new procedures also help to improve decision-making and project performance by ensuring that operations financed by the Bank comply with the requirements set out in the Operational Safeguards (OS) and are therefore sustainable.

They also reduce the need for loan conditionality as corrective measures can be taken in advance and project alternatives are considered and taken into account in project design.

During the project implementation phase, borrowers must ensure the implementation of environmental and social management plans developed to avoid or mitigate adverse effects, while monitoring project impacts and outcomes. Operational staff must supervise the borrowers' work and verify compliance through supervision missions and/or environmental and social audits, whenever necessary.

Throughout the project cycle, the joint involvement of environmental and social experts in project formulation, scoping, field missions and audits is invaluable. Borrowers are responsible for integrating environmental and social considerations into BOAD-financed projects.

BOAD's main operational policies (OPs) are :

- the OP on Environmental and Social Impact Assessment ;
- the OP on Public Participation ;
- the OP on Natural Habitats;
- OP on Forest Management;
- OP on dam safety;
- the OP on international waterways projects;
- OP on projects in disputed areas;
- OP on resettlement of populations
- the OP on indigenous peoples ;
- the OP on cultural heritage;
- the O.P. on pest control;
- the OPP on the consideration of cumulative effects in environmental and social impact studies ;
- the OP on the resolution of global and transboundary issues in environmental and social impact assessment.

#### **3.4.1. The Operational Policy on Environmental and Social Impact Assessments**

WADB requires that projects submitted to it for financing undergo an Environmental and Social Impact Assessment (ESIA) to help ensure that projects are environmentally sound and socially sustainable to facilitate the decision-making process.



Environmental and Social Impact Assessment (ESIA) is a process, the scope, complexity and analytical characteristics of which depend on the nature and scale of the proposed project and the impact it is likely to have on the environment. It consists of assessing the risks that the project may pose to the environment and the effects that it is likely to have in its area of influence, studying alternatives to the project, identifying ways to improve project selection, location, planning, design and execution by preventing, minimising, mitigating or compensating for its negative environmental effects, and enhancing its positive effects.

The Bank may classify the project in one of four existing categories depending on the various characteristics of the project - type, location, sensitivity, scale, nature and magnitude of its potential environmental impacts.

**Category A:** A proposed project is classified in Category A if it is likely to have significant, significant, diverse or unprecedented negative environmental impacts. These effects may be felt over a wider area than the sites or facilities under construction. For a Category A project, the ESIA examines the potential negative and positive environmental effects of the project, compares them to the effects of other feasible alternatives (including, where appropriate, the "no project" scenario), and recommends any measures that may be necessary to prevent, minimize, mitigate or compensate for the project's negative impacts and improve its environmental performance. The Borrower is responsible for the preparation of the report, which should generally take the form of an Environmental and Social Impact Assessment.

**Category B:** A proposed project is classified as Category B if the adverse effects it is likely to have on human populations or on environmentally important areas (wetlands, forests, grasslands and other natural habitats, etc.) are less severe than those of a Category A project. These effects are very local in nature; few of them are irreversible; and in most cases mitigation measures can be more easily designed than for the effects of Category A projects. The scope of the ESIA in this case may vary from project to project, but it is narrower in scope than the ESIA of Category A projects. Like Category A ESAs, however, it examines the potential negative and positive environmental effects of the project and recommends any measures that may be required to prevent, minimize, mitigate or compensate for negative effects and improve environmental performance. The findings and results of Category B project ESIA's are documented in the project documentation (Project Assessment Report (PAR) and Project Entry Form (PEF)).

**Category C:** A proposed project is classified as Category C if the likelihood of its adverse environmental effects is considered minimal. Following the environmental screening, no further ESA action is required for Category C projects.

**Category D:** A proposed project is classified as Category D if it is an environmental and social improvement project.

**IF Category:** A proposed project is classified as an IF if the WADB invests funds through a financial intermediary in sub-projects with potential environmental impacts (provides loans to financial intermediaries).

**NB:** this project is a Category B project with a local impact, which can be controlled by the application of simple safeguard measures.



### 3.4.2. BOAD Operational Policy on Involuntary Resettlement

It aims to:

- avoid or minimize involuntary resettlement and expropriation of land to the extent possible by considering viable alternatives when designing the project;
- design and implement, where displacement is unavoidable, involuntary resettlement and compensation activities as sustainable development programs, providing sufficient investment resources so that those affected by the project have the opportunity to share in the benefits;
- ensure that affected persons are consulted and have the opportunity to participate in all pivotal stages of the process of developing and implementing involuntary resettlement activities;
- assist displaced persons in their efforts to improve their livelihoods and standard of living, or at least to restore them, in real terms, to their pre-displacement or pre-project levels, whichever is more beneficial.

#### Eligibility criteria

Internally displaced persons may belong to one of the following three categories:

- Holders of formal rights to land (including customary and traditional rights recognized by the laws of the country);
- those who do not have a formal right to land at the time the census begins, but who have land or other titles to land provided that such titles are recognized by the laws of the country or may be recognized through a process identified in the resettlement plan; and
- those who have no formal rights or titles likely to be recognized on the lands they occupy.

#### Instruments

To achieve the objectives of this policy, several planning tools can be used depending on the type of project:

- a relocation plan, or a summary relocation plan, is required, with some exceptions for all operations involving involuntary relocation;
- a resettlement policy framework is required, with some exceptions, for operations that may result in involuntary resettlement; and
- a functional framework is prepared for projects involving restricted access.

### 3.5. International texts and agreements applicable to the project

Text	Field of intervention	Relevance to the program
Algiers Convention of 15 September 1968 on the Protection of Nature and Natural Resources	African Natural Resources	The activities must not be a source of degradation of natural resources.



Text	Field of intervention	Relevance to the program
<p>United Nations Framework Convention on Climate Change (adopted in Rio on 5 June 1992 and ratified in June 1994) and the Kyoto Protocol (in force since February 2005).</p>	<p>Climate Change and Protection of the Ozone Layer</p>	<p>Presence in the project, in the work phase, of activities likely to generate greenhouse gases (CO<sub>2</sub>) involved in climate change. Therefore, pursuant to Article 2 of this Convention, all provisions to reduce these CO<sub>2</sub> emissions will have to be implemented. On the other hand, during the commissioning phase, the project represents a good opportunity to combat greenhouse gas emissions.</p>
<p>Bamako Convention adopted at Bamako on 30 January 1991 and ratified on 16 February 1994.</p>	<p>Waste Management</p>	<p>Production during the construction and operation phase of special waste: used oils and batteries, etc. The conditions and modalities of management of these hazardous wastes will have to be in conformity with the directives of this convention.</p>
<p>Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal It was adopted in March 1989 and entered into force on 5 May 1992.</p>	<p>Waste Management</p>	<p>Senegal acceded to the Basel Convention on 10 November 1992. The founding principle of the Convention is the "environmentally sound management" of hazardous waste. This principle is understood as "all practical measures to ensure that hazardous wastes or other wastes are managed in a manner that ensures the protection of human health and the environment against the adverse effects that such wastes may cause".</p>

### 3.6. Institutional framework

The project's compliance with the Environmental Code and other planning documents requires the participation of various institutions which are listed in the following table:

**Table 2:** Institutions / Administrative entities involved in the implementation of the project

Strategic level		Operational level	Areas of involvement
Ministry of the Environment and Sustainable Development	Department of Environment and Classified Establishments	Regional Division of Environment and Classified Establishments	<ul style="list-style-type: none"> <li>- Conformity check</li> <li>- Follow-up of the environmental management of projects</li> <li>- Accompaniment of ASER in the implementation of the environmental strategy of the project.</li> </ul>
	Department of Water, Forests, Hunting and Soil Conservation	Regional Inspectorate of Water and Forestry (IREF) and Water and Forestry Sectors (SEF)	<ul style="list-style-type: none"> <li>- Soil defense and restoration</li> <li>- Biodiversity conservation</li> <li>- Accompaniment in compensatory reforestation, etc.</li> </ul>
Ministry of Petroleum and Energies	National Electricity Company (SENELEC)	-	Validation of the technical specifications of the components of the Electrification component
	National Agency for Renewable Energies (ANER)	-	Coherence and capitalization of the interventions of the Project (Solar Power Plants) in the national policy of promotion of renewable energies.
	Senegalese Rural Electrification Agency (ASER)	-	<ul style="list-style-type: none"> <li>- Project ownership</li> <li>- Validation of the technical specifications of the project components</li> </ul>
Ministry of Town Planning and Housing	Directorate of Urbanism and Architecture	Regional Service of Town Planning and Architecture	<ul style="list-style-type: none"> <li>- Authorization to build</li> <li>- Supervision of ground occupation</li> </ul>
	Directorate of construction		
Ministry of Town and Country Planning and	Directorate of Local Authorities	Regional Support Service for Local Development	Multidimensional assistance to populations in all areas of grass-roots economic and social development
	Directorate of Strategies for		



Strategic level		Operational level	Areas of involvement
Local Authorities	Territorial Development		
	Local Development Support Department		
	National Agency for Spatial Planning	Regional Service of Spatial Planning	Monitoring the Coherence of the interventions with the regional land use plan
Departmental councils		Regional Development Agency	Advisory support to local authorities
<b>Other entities involved</b>			<b>Areas of involvement</b>
Municipalities concerned			<ul style="list-style-type: none"> <li>- Management of the local environment</li> <li>- Coherence of ASER's interventions in local development planning</li> </ul>
Non-Governmental Organizations and CBOs			<ul style="list-style-type: none"> <li>- Supervision and technical training of populations in all sectors of local development.</li> <li>- Multidimensional assistance to populations in all areas of grassroots economic and social development.</li> </ul>
Regional Technical Committees (RTC) / Regional Environmental Monitoring Committees (REMC)			The RTCs will be frameworks for consultation, coordination and participation at the grassroots level. They will bring together the representatives of decentralized services, grassroots farmers' organizations, private operators concerned by the project, NGOs and development projects operating in the project area.
The Local Development Support Centres (CADL)			The CADLs provide assistance in the implementation of the activities of Local Authorities, CBOs, NGOs and projects and programmes. In this respect, the CADL must be a privileged partner of ASER in the implementation of the project.



## CHAPTER 4: ENVIRONMENTAL PROFILE OF THE PROJECT INTERVENTION AREA

This chapter describes the project's receiving environment in terms of its physical, biological and socio-economic components. Its objective is to characterize the environmental context in which the project will be implemented in order to identify the sensitive elements that may be affected by the project. It summarizes the basic data and presents, in particular, the environmental and social issues mainly in the target regions.

The scope of the study area suggests a division of the target regions into three (03) zones. The proposed division is presented below:

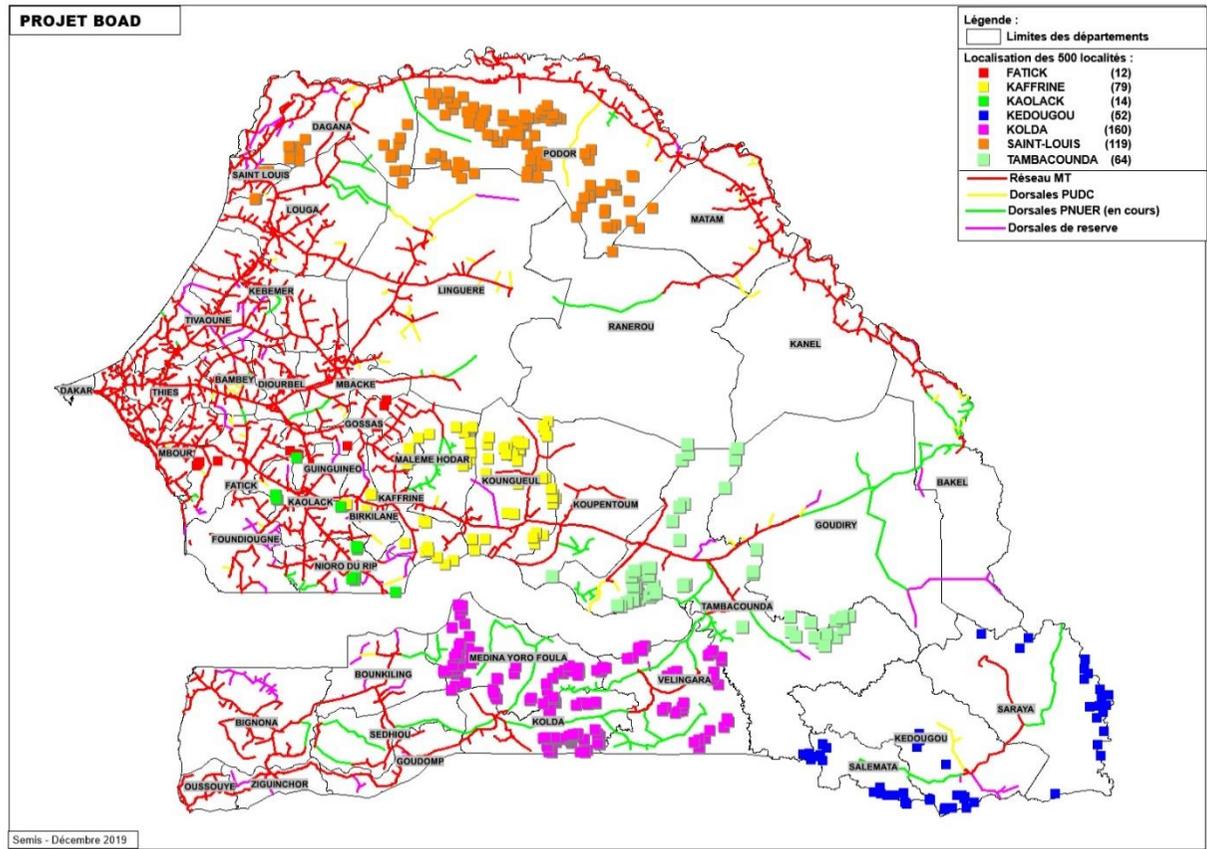
- Northern zone (Saint Louis);
- Central Zone (Fatick, Kaolack & Kaffrine);
- South Zone (Tambacounda, Kédougou & Kolda).

It should be noted that not all departments in these administrative regions are concerned by this study.

The departments actually concerned are 15 in number and are presented below (Table 3).

**Table 3:** The targeted departments and regions of the study area

Zone	Regions	Departments
NORTH	Saint Louis	Dagana, Podor
CENTRE	Fatick	Fatick, Gossas
	Kaolack	Kaolack, Nioro
	Kaffrine	Kaffrine, Mbirikilane, Kounghoul, Malem Hoddar
SOUTH	Tambacounda	Tambacounda
	Kédougou	Kédougou, Saraya, Salémata
	Kolda	Kolda, Médina Yoro Foulah, Vélingara



**Figure 7: Map of target villages**

#### 4.1. Physical environment

The study area is defined according to the specificities of each parameter under study.

##### 4.1.1. Climatology

###### 4.1.1.1. North zone

<b>Saint Louis</b>	The climate of the region is of the Sahelian type characterized by warm and dry continental trade winds or Harmattan and maritime trade winds to the west. The average annual temperatures are relatively high with, however, the softening influence of the sea to the west, which is favorable to market gardening.
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Table 6: Summary of the main climatic factors in the target regions of the Northern Zone

Climatic parameters ( Period 1980-2018)				
Region	Average precipitation	Mean temperature	wind	Relative humidity
Saint Louis	250 mm	27.9 ° C	- Main direction: N-NW - Average speed: <b>3.1 m / s</b>	50%

Source : ANACIM

###### 4.1.1.2. Central zone

<b>Fatick</b>	The climate of the Fatick region is of the Sudanese tropical type marked by the Sahelo-Sudanian variant and a Sudano-Sahelian variant with a short rainy season from June-July to October and a long dry season from 08 to 09 months.
<b>Kaolack</b>	The climate of the Kaolack region is of the Sudano-Sahelian type with a short rainy season from June-July to October and a long dry season of 08 to 09 months.
<b>Kaffrine</b>	The climate is Sudano-Sahelian with a short rainy season from June-July to October and a long dry season from 08 to 09 months.

Table 7 : Summary of major climatic factors targeted regions of Central zone

Climatic parameters ( Period 1980-2018)				
Regions	Average precipitation	Mean temperature	wind	Relative humidity
Fatick	667.4 mm	28.6 ° C	- Dominant direction : N-NE - Average speed : <b>2.6 m / s</b>	59.9%
Kaolack	709.4 mm	29.2 ° C	- Dominant direction e : N - Average speed : <b>2.5 m / s</b>	78.6%
Kaffrine	600-700 mm	29 ° C	- Dominant direction : E-SW - Average speed : <b>2.5 m / s</b>	59%

Source : ANACIM

###### 4.1.1.3. South zone

<b>Tambacounda</b>	The region lies between the 450 and 800 mm isohyets. It is one of the wettest regions in the country. However, this rainfall varies in time and space: August and September are the wettest months, the rainy season lasts 4 to 5 months and is staggered from South to North. For temperatures, there are two (02) major periods of thermal regime: - the period of low temperatures, from July to February with more freshness during the months of December and January; - - and the period of high temperatures between March and June.
<b>Kédougou</b>	The region has a Sudano-Guinean climate. The rainy season lasts about 06 months, from May to October, with a dry season of 06 months also from November to May. It is subject to the harmattan for seven (07) months: October to April.
<b>Kolda</b>	The climate of the Kolda region is of the Sudano-Guinean type. The rainy season runs from June to October with maximum intensity in August and September, while the dry season covers the period from November to May.

Table 8: **Summary of the main climatic factors in the target regions of the southern zone**

Climatic parameters (Period 1980-2018)				
Regions	Average precipitation (mm)	Average temperature (° C)	wind	Relative humidity (%)
<b>Tambacounda</b>	825	28.8	- Dominant direction : <b>W</b> - Average speed : <b>2.6 m / s</b>	50
<b>Kedougou</b>	700 - 1300	23-38	Wind speed : 2m / s	50
<b>Kolda</b>	700 - 1300	28	- Dominant direction : E NE & O - average wind speed : <b>1.6 m / s</b>	73

Source: ANACIM

#### 4.1.2. Geology of the area

The major geological assemblages in the Study Area are as follows:

- formations on Quaternary or recently volcanic terrains such as littoral and deltaic sub-formations, on alluvial and colluvial deposits and aeolian.
- formations on secondary and tertiary terrains, such as :
- formations on more or less clayey sandstone of the "Continental Terminal" (Oligo-Mio-Pliocene);
- formations on marly limestone rocks of the Paleocene and Eocene;
- formations on Maestrichtian sandstone (Cretaceous).

- formations on primary rocks or ancient sedimentary volcanic rocks such as :
- formations on rocks of essentially sedimentary origin or on soft argillaceous sandstone and quartzites or on argillaceous sandstone and pelites or on pelites with a paleovolcanic facies or on metamorphosed shales ;
- formations on essentially metamorphic rocks with various basic rocks and swelling clayey material of alteration or with acidic, migmatitic rocks or residual gravelly material ;
- formations on granitic-type rocks (anatectic granites);
- formations on microgenetic igneous rocks (post-tectonic granites or diorites and metabasites).

Their presence and the share of each formation varies according to the area concerned (Table 4).

**Table 4 :** Geological formations in target departments

Zones	Target regions	Target departments	Geological formations
<b>NORTH ZONE</b>	Saint Louis	- Dagana - Podor	Training on alluvial and colluvial deposits
			Wind formations (Old Ergs)
			Wind formations (recent Ergs)
			Coastal and deltaic formations
			Water
<b>CENTER ZONE</b>	- Fatick Kaolack - Kaffrine	- Fatick - Gossas - Kaffrine - Mbirkilane - Kounghoul - Malem - Hoddar - Kaolack - Nioro	Training on alluvial and colluvial deposits
			Wind formations (recent Ergs)
			Coastal and deltaic formations
			Formations on more or less clayey sandstone (CT)
			Water
<b>SOUTH ZONE</b>	- Tambacounda - Kédougou - Kolda	- Tambacounda - Kédougou - Saraya - Salémata - Kolda - Vélingara - Médina Yoro - Foulah	Training on alluvial and colluvial deposits
			Formations on more or less clayey sandstone
			Formations on rocks of sedimentary origin
			Formations on granitic-type rocks
			Formations on igneous rocks
			Formations on marl-limestone rocks (P-E)
			Metamorphic Rock Formations

#### 4.1.3. The typology of the relief in the study area

Overall, the different morphologies found in the study area are:

- the high areas where we find the plateaux and the residual mounds, cliffs, foothills, edges of plateaux, hills, dunes;

- the intermediate zones which are the dunes, the inter dunes, the undulating, the attenuated, the slopes, slopes and glacis;

- low areas with plains, basins, lowlands, barrier beaches, coastal complex, lagoon deposits, breakup levees and deltas, depressions, peneplaned surfaces, low glacis, valleys, mudflats, barrier beaches, plains, etc.

The share of each relief in the areas concerned is identified in the following table.

**Table 5:** Terrain typology in targeted departments of the area of study

Zones	Regions concerned	Dep. concerned	Type connects f
<b>NORTH</b>	Saint Louis	- Dagana - Podor	Lowlands
			Coastal cords
			Settling bowls
			dunes
			Inter dunes
			Lifts and rupture delta
			Attenuated models
			Ondu shaped strip which
			Peneplaned surfaces
			Sandy terraces
			valleys
			mudflats
Water			
<b>CENTER</b>	- Fatick Kaolack - Kaffrine	- Fatick - Gossas - Kaffrine - Mbirkilane - K oungheul - Ma lem Hodd ar - Kaolack - Ni o	Low plains and basins
			Attenuated models
			Trays and goal t are re siduels
			valleys
			mudflats
			slopes
			P ales e t glaze
<b>SOUTH</b>	- Tambacounda - Kedougou - Kolda	- Tambacounda - Kedougou - Saraya - Salemata - Kolda - Vélingara - Medina Yo ro Foula h	Tray borders
			Buttes and interfluves
			Hills
			Side
			Indications of depression are trays sions
			Glazes or interfluves and glazes
			P entes
			Piedmont
			P wool
			Residual trays and mounds valleys
			Slopes, slopes and glacis
Water			

#### 4.1.4. Soil resources

There are several soil types in the Study Area and they are identified in the following table.

**Table 6 : Soil typology in the study area**

<b>Type of soil</b>	<b>Characteristics &amp; location in the study area</b>
<b>Lithosols</b>	These are skeletal floors. Lithosols on cuirass in the central and southern zone, lithosols on sandstone or quartzite or on gravelly material in the southern zone. These soils may be associated with others such as Regosols or poorly developed soils with hydromorphic input.
<b>Régosols</b>	These are very poorly evolved soils. They are mostly found in the southern zone. These soils are either on sandstone shells, on basic or miscellaneous rock debris, or on gravelly or gravelly material. They can also be associated with other soils such as those that are poorly evolved with hydromorphic input or those that are green on clayey material or those that are tropical ferruginous or ferralitic, etc.
<b>Brown-red soils</b>	These are soils formed on the Ogolian dunes. They have a uniform red colour throughout the profile with a low organic matter content. They are very sensitive to wind erosion when they are bare. They are found in the northern zone.
<b>Tropical ferruginous soils</b>	They are characterized by a wealth of individualized iron sesquioxides spread over the whole profile or very often accumulated in lower horizons in the form of spots or concretions. These soils may or may not be drained, with concretions and stains. They can be combined with other soils (hydromorphs, lithosols).
<b>Halomorphic soils</b>	They are soils formed on deltaic alluvial deposits. They are clayey and also have hydromorphic characteristics. They are marked by high levels of soluble salts that precipitate on the surface during the dry season.
<b>Hydromorphic soils</b>	They are characterized by an excess of water due to temporary waterlogging or by the fluctuation of a water table. They are mainly gley or pseudogley soils, which occupy river beds. They correspond to the various alluvial deposits of the floodplain bordering the area. They are also soils of low or flat areas containing clay.
<b>Vertical floors</b>	They are soils on swelling clay material. They are essentially characterized by a very high chemical richness and unfavorable physical properties. On the surface, they present a rather discontinuous relief marked by the presence of small mounds of depressions and collapses. They are dark grey, black or dark brown clay soils with a wide prismatic structure and sliding facies. They have low porosity and strong cohesion.
<b>Raw mineral soils or poorly developed input soils</b>	These soils are found on the outcrops of shales located on certain steep slopes (hillsides). They are cuirasses on clayey sandstone, gravelly soils on cuirasses.

The detail of the soil typology according to the zones is provided below (see following table)



**Table 7 :** Detail of the soil typology in the departments of the study area

Zones	Target regions	Target departments	Soil types
<b>North</b>	Saint Louis	- Dagana - Podor	Brown-red soils
			Tropical ferruginous soils
			Halomorphic soils
			Hydromorphic soils
			Raw mineral soils
			Poorly developed input soils
			Vertical floors
			Water
<b>Centre</b>	- Fatick - Kaolack - Kaffrine	- Fatick - Gossas - Kaffrine - Mbirkilane - Koungeul - Malem Hoddar - Kaolack - Nioro	Lithosols
			Régosols
			Tropical ferruginous soils
			Halomorphic soils
			Hydromorphic soils
			Poorly developed input soils
			Water
<b>South</b>	- Tambacounda - Kédougou - Kolda	- Tambacounda - Kédougou - Saraya - Salémata - Kolda - Vélingara - Médina Yoro Foulah	Lithosols
			Régosols
			Tropical ferruginous soils
			Hydromorphic soils
			Poorly developed input soils
			Vertical floors
			Water

#### 4.1.5. Water resources

Water resources are made up of surface water and groundwater.

##### 4.1.5.1. Surface waters

According to the DGPRES division, the study area is located in the four (04) Water Management and Planning Units out of the five (05) that the country has. These PMUs are:

- The Senegal River Valley ;
- the Groundnut Basin;
- Eastern Senegal;
- Casamance.

These PMUs are divided into sub PMUs.

**Table 8 : PMU and Sub PMU in the Study Area**

Areas	Target Departments	UGP
<b>NORTH</b>	- Saint Louis - Podor	Senegal Valley
<b>CENTRE</b>	- Fatick - Gossas - Kaffrine - Mbirkilane - Koungeul - Malem - Hoddar - Kaolack - Nioro	Groundnut basin
<b>SOUTH</b>	- Tambacounda - Kédougou - Saraya - Salémata - Kolda - Vélingara - Médina Yoro - Foulah	Groundnut basin Eastern Senegal Casamance

In these PMUs, the most important watersheds are the following.

The Senegal River Delta, whose main watercourses are :

- The Senegal River
- the Khant
- Ngalam
- the Djeuss
- the Lampsar
- the Djeuck
- the Ndiawsir
- Etc.



The Falémé is the most important tributary of the Senegal River. Its basin covers an area of 18 km<sup>2</sup>.

The Ferlo Valley.

The Sine, whose lower valley is of interest to the study area, covers an area of 5915 km<sup>2</sup>. The main watercourse is intermittent.

The Saloum consists of :

- - The Lower Saloum which has an area of 4653 km<sup>2</sup>.
- - the Northern tributary of the Upper Saloum Valley covers an area of 3166 km<sup>2</sup>.
- - the Southern tributary of the Upper Saloum Valley has an area of 4315 km<sup>2</sup>.
- The Sine-Saloum Estuary or Saloum Delta covers an area of 3615 km<sup>2</sup>. The main rivers are the tributaries of the Saloum River, the Diombos.

The Gambia: this river is the outlet of the main rivers in the southern zone. Its main tributaries are the following:

- - The Great Baobolong has an area of 3245 km<sup>2</sup>.
- - the Nianila Bolong has an area of 5741 km<sup>2</sup>. These main rivers are the Nianila and the small tributaries of the Gambia River.
- - the Koulountou
- - the Niokolo: which is a 203 km long river with a catchment area of 4732 km<sup>2</sup> at its confluence with the Gambia at 11 m altitude.
- - Lamoudian.
- - Niaoulé.
- - Niériko.
- - Sandougou.
- - Sima.
- - Tabadian.

The Casamance and the Soungrou: the Casamance is a 320 km long river. It rises in the east of the natural region of Casamance, around Fafacourou and flows into the Atlantic Ocean. Its tributary of interest to the area is the Soungrougrou.

The Kayanga: is a river that rises in the Fouta Djallon massif (Republic of Guinea) at 60 m altitude. It enters Senegal after a course of 150 m, descends towards the South-West and joins Guinea-Bissau where it takes the name of Rio Geba. In Senegal, the Kayanga is joined by the Anambé river south of Vélingara..

#### **4.1.5.2. Groundwaters resources**

The aquifer systems in the Study Area as a whole consist of :

- the shallow aquifer system known as the "terminal complex" which includes:
  - the predominantly Quaternary sandy-clay and sandy formations (QT)
  - the predominantly sandy-clayey and sandy formations of the Continental Terminal (CT)
  - Oligo-Miocene (OM) formations.



Reserves are estimated at between 50 and 75 billion m<sup>3</sup>.

- the intermediate aquifer system which includes :
  - o the essentially calcareous, karstic in places, and marly-calcareous formations of the Eocene (EO);
  - o the formations of the Paleocene (PA).

Reserves are estimated at between 60 and 110 billion m<sup>3</sup>.

- the deep aquifer system which includes :
  - o the Maastrichtian horizons
  - o the horizons of the Campanian
  - o the horizons of the Lower Senonian.

This system extends over almost the entire Senegalese basin. It constitutes a huge reservoir with reserves estimated at between 300 and 400 billion m<sup>3</sup>.

- the basement aquifer system, which includes discontinuous to semi-continuous aquifers of cracked and weathered granitic and metamorphic formations in eastern (south-eastern) Senegal, with aquifers whose quality and volume are still unsatisfactory.

The following table shows the characteristics of the aquifer systems at the level of the targeted departments in the study area.

**Table 9:** Aquifers in the Study Area

Areas	Target departments	Acquifers
<b>NORTH</b>	- Saint Louis - Podor	Eocene Limestones - North Shore - Maastrichtian - Salt water unit
<b>CENTER</b>	- Fatick - Gossas - Kaffrine - Mbirkilane - Koungeul - Malem Hoddar - Kaolack - Nioro	- Salt water unit - CPU (Continental Terminal/Oligo-Miocene / Maastrichtian)
<b>SOUTH</b>	- Tambacounda - Kédougou - Saraya - Salémata - Kolda - Vélingara - Médina Yoro Foulah	- Granite base - Metamorphic base - Maastrichtian - CPU (Continental Terminal/Oligo-Miocene / Maastrichtian) - Eocene limestones.

## 4.2. Biological environment

### 4.2.1. Fauna and flora

#### 4.2.1.1. North Area

<p><b>Saint Louis region</b></p>	<p>It is characterized by a shrubby and woody stratum dominated by woody plants and a herbaceous stratum consisting of winter pastures. The vegetation cover does not have the same physiognomy; it varies according to the distance from water areas. On the edges of water bodies, there is dense aquatic vegetation dominated by <i>Typha australis</i> and <i>Phragmites australis</i> (reed), the density of which hinders agricultural, fishing, pastoral and domestic activities. In the more remote areas, vegetation is severely degraded due to the drop in rainfall, the advance of the agricultural front and anthropic actions to meet the need for wood for energy and services. Only species from arid and semi-arid zones reside there. The most representative woody species are <i>Balanites aegyptiaca</i>, <i>Acacia raddiana</i>, <i>Acacia senegal</i>, <i>Boscia senegalensis</i>, <i>Acacia seyal</i>, <i>Salvador persica</i>, <i>Zizyphus mauritiana</i> and <i>prosopis</i>, <i>Tamarix indica</i>. The dominant herbaceous species are : <i>Aristida</i> sp, <i>Cenchrus biflorus</i>, <i>Tribulus terrestris</i>, <i>Dactyloctenium aegyptium</i>, <i>Cassia occidentalis</i> and <i>Maerua oblongifolia</i>.</p> <p>As for the fauna, the number of migratory birds is estimated at about three million, divided into 350 species, in particular the pink flamingo, the white pelican (<i>Pelecanus onocrotalus</i>), four (04) species of egrets, the Gambian goose and the grey heron. Ducks are numerous (stumps, pilets, teals, etc.). We can also observe large cormorants, kingfishers and ospreys. Lizards and pythons sometimes hide in the grass, as well as crocodiles. Mammals are mainly red monkeys (patas) and warthogs, but hyenas, Libyan cats, servals and dorcas gazelles also live in the park.</p>
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#### 4.2.1.2. Central zone

<p><b>Fatick region</b></p>	<p>Vegetation follows the overall climatic and stationary configuration perfectly and shows very marked variability from one area to another. However, most of the forest formations remain confined to the department of Foundiougne and a little to the south of the districts of Fimela and Tattaguine. The ecological situation of the region is marked by a general trend of degradation of plant resources, due to several factors in synergy, including land clearing, logging for various uses, bush fires, factors that have been exacerbated by periods of drought. This situation has ended up shaping landscapes such as the Mangrove River and certain forest formations adjacent to villages with high human density. In the ferruginous areas of the northern, north-eastern part of the region, <i>acacia albida</i> is found in the form of ageing parks in the agrarian landscapes. Moving southwards in the continental part of the estuary and in the polyculture zone, the cover</p>
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	<p>is gradually enriched with Sudano-Guinean species such as <i>Anogeisus leiocarpus</i>, <i>Cordila pinnata</i>, <i>Pterocarpus erinaceus</i>, <i>Detarium senegalense</i>. <i>Borassus akeassii</i> is present in particular in the district of Fimela where the Samba Dia rônèraie erected as a Biosphere Reserve is located and elsewhere, in the district of Tattaguine, we can also note the Doudame rônèraie. The mangrove with <i>Avicennia nitida</i>, <i>Rhizophora racemosa</i> and <i>Langunculari</i> occupies the shores of the inlets. It constitutes a biological reservoir and an important ecological and economic potential for the region. The classified forest estate covers an area of 87,577 ha, i.e. a classification rate of about 13%.</p> <p>The Fatick region has an abundant and varied fauna (terrestrial fauna, sedentary avifauna, migratory avifauna). This is favoured by the presence of wetlands in the south-eastern part with numerous forest massifs including the Saloum Delta National Park (PNDS) and an important mangrove (an ecosystem providing a secure habitat for wildlife). As for the vegetation, it is the department of Foundiougne that contains the essential wildlife resources. Manatees (<i>Trichechus senegalis</i>), humpback dolphins (<i>Souga teuszii</i>), common dolphins (<i>Delphinus delphis</i>) and several species of marine turtles are found in the maritime section of the Park but are highly threatened. In addition, 36 wild mammal species have been recorded in the Saloum Delta area, particularly in the PNDS (Saloum Delta National Park). Among these species, the leopard (<i>Panthera pardus</i>) and the roan antelope (<i>Hippotragus equinus</i>) have recently become extinct. Among the crustaceans are some fifty species of lobsters, shrimps and stomatopods. In addition the carp (<i>Lisa bandialensis</i>) or (Yaakh) and groupers (<i>Epinephelus aenus</i>) or Thiof, are decreasing because being species very highly demanded by Senegalese consumers. In addition sharks: <i>Caranx hipos</i>, <i>Tilapia guineensis</i> and turtles have seen their numbers decrease mainly due to disturbances in their nesting areas and overexploitation. Sharks and rays, whose fins have a high commercial value, are fished intensively.</p>
<p><b>Kaolack region</b></p>	<p>The vegetation is very varied and includes shrubby savannah to the north and more or less wooded savannah to the south and south-east. Factors contributing to the degradation of wildlife resources include :</p> <ul style="list-style-type: none"> <li>- an extension of the cultivated areas due to the increase of the population</li> <li>- the frequency of bush fires</li> <li>- clandestine exploitation</li> <li>- the proliferation of jackals and hyenas that are true predators of chickens.</li> </ul> <p>In spite of these various aggressions, especially anthropic, the environment still offers favourable conditions for the presence of a more or less rich and varied fauna. The most frequently encountered species are :</p> <ul style="list-style-type: none"> <li>- land game birds (turtle doves, francolins, gangas, quails, pigeons, guinea fowls, etc.).</li> </ul>



	<ul style="list-style-type: none"> <li>- furry game (warthog, hare, jackal, red monkey, harnessed guib, basin, etc.).</li> <li>- migratory birds (Kestrel and Elanion naucler falcons) that are encountered during the migration period (October - March) in the Kousmar Classified Forest, which constitutes (according to some sources) one of the largest dormitories in the world.</li> </ul>
<p><b>Kaffrine region</b></p>	<p>Kaffrine is located in the transition zone between the Sahelian domain and the Sudanese domain. This configuration gives it a very varied vegetation. To the north, notably in a large part, there is a shrubby savannah characterized by an ecosystem that includes forest species typical of the Sahelian zone. These are Combretum sp, Balanites aegyptiaca, Lannea acida, Bauhinia rufescens, Adansonia digitata, Anageissus leocarpus, etc.. In the south, we have a wooded savannah with a more varied floristic composition. The most frequent species are : Cordyla pinnata, Pterocarpus erinaceus, Daniellia oliveri, Parkia biglobosa, Tamarindus indica, Prosopis africana, Sterculiasetigera, Parinari macrophila.</p> <p>The diversity of wild habitats explains the presence of 300 species of birds in the region. The fauna is mainly composed of avifauna and furry fauna. The avifauna is made up of terrestrial and aquatic species, the most common of which are :</p> <ul style="list-style-type: none"> <li>- guinea fowl</li> <li>- the Francolins</li> <li>- turtle doves</li> <li>- quail</li> <li>- bustards</li> <li>- the gangas</li> <li>- Gambia geese</li> <li>- hornbills</li> <li>- the robins.</li> </ul> <p>The furry fauna consists of big game such as warthogs found in swampy areas and valleys, harnessed guibs, monkeys, red-fronted gazelles, hyenas and a few cobes. Small game includes mongooses, palm rats, jackals and civets.</p>

**4.2.1.3. South region**

<p><b>Tambacounda region</b></p>	<p>The flora is abundant and varied given the ecological conditions favourable to its development and the diversity of ecosystems. As the dominant woody species, we have the combretaceae with mainly Combretum glutinosum. The other species are : Acacia sp, Tamarindus indica, Sterculia setigera, Guiera senegalensis, Adansonia digitata, Ceiba pentandra, Pterocarpus erinaceus, etc. The herbaceous stratum is essentially dominated by Andropogon sp.</p>
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	<p>The region's wildlife potential is very rich: 19 species of molluscs, 61 species of fish, 20 species of amphibians, 34 species of reptiles, 327 species of birds, 70 species of mammals (herbivores, carnivores, omnivores) including a majority of baboons, warthogs, buffalo cob, guib and buffalo. But we also find large carnivores such as the panther, the lion and other rare species such as the Derby elk, the hippotrague, the aardvark, the bushpig, the crocodile, the turtles and the hippopotamus.</p>
<p><b>Kédougou region</b></p>	<p>The region's plant formations cover an area of 1,606,514 ha, i.e. 95% of the regional territory. Vegetation includes several types of formations, the main ones being: 1a steppe, savannah, open forest, gallery forest, swampy meadows.</p> <p>For wildlife, the region has very important potentialities because of its varied habitats favourable to the development of wildlife. Part of the KNP (which is a World Heritage site) occupies a large area in the Kédougou region. This region is also home to a large part of the Falémé ZIC. It is home to warthogs, dog-heads, chimpanzees, antelopes, hares, hyenas, monkeys and game birds, the most common being guinea fowl and francolins. Hippopotamuses and crocodiles are present in places on the Gambia and Falémé rivers.</p>
<p><b>Kolda region</b></p>	<p>The Kolda region is the domain of wooded savannah and dry open forest with species characteristic of the Sudanese domain and dense stands of bamboo. It is covered by 50,000 ha of the Niokolo Koba National Park and has very large areas of forest terroirs. However, its forest estate is facing unprecedented human pressure. Among the species in the region are <i>Parkia biglobosa</i>, <i>Cordyla pinnata</i>, <i>Ceiba pentandra</i>, <i>Pterocarpus erinaceus</i> <i>Terminalia</i> sp, etc.</p> <p>The fauna is present due to the different types of forest formations that constitute favourable habitats for their relatively large presence. All these resources, both plant and wildlife, are subject to more or less controlled exploitation. With regard to the development of wildlife resources, the three (03) departments are open to regular hunting.</p> <p>The region has seventeen (17) amalgamated zones covering an area of 613,525 ha. The species encountered are as follows.</p> <ul style="list-style-type: none"> <li>- Hairy fauna: Warthog, Hippopotamus, Patas, Dog-headed dog, Monkey, Green, <i>Cercopithecus</i> rattlesnake, Harnessed Gib, Hare, Palm Rat, Pig and Woodpecker, Civet, Genet, Mongoose, Wild Cat, Hyena, Duiker.</li> <li>- avifauna: Turtle Doves (collared, mated, cape, woodland, mourning, etc.), Pigeons (guinea, roosting, green); Ganga, Francolin, Guinea Fowl, Rock Chicken, Pelican, Hornbill, <i>Dendrocygne</i> Geese, Fishing Eagles, Crowned Crane, etc.</li> </ul> <p>Some Reptiles such as snakes and crocodiles are present.</p>

#### 4.2.2. Protected areas

Protected areas are composed of the classified area and the protected area.

<b>Protected area</b>	<p>It is made up of all the areas of uncultivated land, whether or not covered by unclassified wooded formations. Its management is the responsibility of the local authorities, which are authorised to allocate land for housing or cultivation and to grant authorisations for land clearance. The forest formations of the protected area have always been home to forestry activities (charcoal production, harvesting products, honey, wildlife resources, etc.) and are also good pastures. Some of them, because of their rich flora, could be classified as forests of regional interest.</p>
<b>Classified areas</b>	<p>This is the set of classified areas that are :</p> <ul style="list-style-type: none"> <li>- Classified Forests (FC), which are constituted for the purpose of their conservation, enrichment and regeneration of soils, by any means of management and protection.</li> <li>- the Sylvo-pastoral reserves (RSP) which are natural formations with restrictions on industrial crops to allow biomass exploitation.</li> <li>- National parks (NPs) which are areas where the exploitation of wildlife, flora and soil resources for nature conservation is prohibited.</li> <li>- Marine Protected Areas (MPAs) which are areas delimited and monitored for the purpose of protecting marine resources.</li> <li>- Hunting Interest Zones (ZIC) which are a part of the territory where game and hunting are of economic and scientific interest.</li> <li>- Biosphere Reserves are areas of ecosystems that aim to promote solutions to reconcile the conservation of biodiversity with its sustainable use. They are internationally recognized.</li> <li>- Forest Massifs are forests of community interest, managed by communities.</li> </ul>

#### 4.3. Land use in the project area

In relation to the methodology of landscape ecology, we can highlight:

- the role of the structuring elements present in the study area, in particular the targeted departments in the North, Centre and South zones
- Weaknesses in the natural functioning of the habitats present
- the assets to be preserved.



#### 4.3.1. Cultivated areas

The areas to be covered by the project are included in an agrarian ecosystem. The dominant management method is rain-fed agriculture and market gardening. Different agro-forestry technologies can be identified. These are :

- Agro-forestry parks at "Kaad".
- Agro-forestry Parks in Baobab
- of the Agro-Forestry Parks in Rônier.

In addition to the species mentioned, the agrarian system (ecosystem) presents some species with multiple uses. It should be noted that in some places, certain agricultural lands have a poor plant diversity due to management and land use patterns.

#### 4.3.2. Classified and community areas: marginal lands

This is marginal land, i.e. land not affected by the agricultural front and old fallow land. The vegetated areas, covered by the project area, host vegetation dominated by scrub within which woody plants (family Combretaceae) can be observed. The inter-village vegetation areas present a greater floristic diversity than that found in farmland.

#### 4.3.3. The tannins

These are areas with no vegetation: they are called naked tannins. However, in some parts there is herbaceous vegetation: in these cases we speak of grassy tannins dominated by *Sesuvium portulacastrum*, *Philoscerus vermicularis*, *Sporobolus robusta*, *Schizochirium compressa* and *Paspalum vaginatum*. As far as woody plants are concerned, we mainly have *Tamarix senegalensis*.

#### 4.3.4. Natural vegetation

It's about:

- gallery forests
- savannas, whether wooded, wooded or shrubby
- of mangroves in coastal areas under marine influence
- shrubby and wooded steppes.

#### 4.3.5. Wetlands

Mudflats are nearshore, estuarine, freshwater or submarine habitats consisting of fine sedimentary, non-sandy materials. The waters consist of rivers, tidal pools, lakes and ponds. Floodplains are also included..

#### 4.3.6. Other areas

These are human dwellings and areas of mining, quarrying or infrastructure.

### 4.4. Habitats and ecological roles

**Table 1:** Summary of the different habitats and their ecological roles

Habitats	Typology	Role
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<p>Agricultural land</p>	<ul style="list-style-type: none"> <li>- Cultivated fields (rain-fed agriculture)</li> <li>- Fruit tree plantations</li> <li>- Market gardening plots</li> <li>- Rice growing (plateau and lowland)</li> </ul>	<p>Agricultural land is the dominant feature of the landscape. It includes annual crop fields, fruit tree plantations, market garden plots and cassava plantations.</p> <p>Agricultural land provides the link between the different habitats or units. They constitute an element of coherence in the study area.</p>
<p>Artificial corridors</p>	<p>Boundary hedges</p>	<p>Artificial corridors form an ecologically important environment: for the fauna by constituting areas of movement, refuge, feeding and nesting, and for the flora by constituting privileged areas for certain species.</p>

#### 4.5. Major environmental issues identified in the project's area of influence

The analysis of the environmental context of the various areas where the project is to be carried out has made it possible to identify the environmental issues that will require special attention during the preparation and execution of the work. The analysis takes into account: global issues related to environmental conditions.

The sensitivity of these issues is analyzed in the table below in relation to compatibility with the project.

**Table 2 : Environmental Issues**

Topic	Issues	Features of the project area	Level of challenge (high, low, medium)	Compatibility with the project	Sensitivity class		
					Low to None	Medium	High
<b>Biodiversity</b>	Preservation of flora and fauna resources	Indeed, the regions involved are, to varying degrees, areas with diverse ecosystems with the existence of classified and community forests, with a rich fauna and flora in particular.  Nevertheless, others in these regions are in a situation of progressive degradation.	<b>High</b>	<p>The project could be located in protected areas (nearby, in part or all).</p> <p>This implementation can only be effective after decommissioning according to a legal procedure that has been set up.</p> <p>Some classified forests are very sensitive to the project due to the importance of the ecological and socio-economic services they provide to the population. Its establishment could cause damage to natural resources depending on the potential of a given area:</p> <ul style="list-style-type: none"> <li>- degradation due to more assiduous use;</li> <li>- Illegal logging;</li> <li>- increase in poaching and depletion of wildlife;</li> </ul>			<b>X</b>

Topic	Issues	Features of the project area	Level of challenge (high, low, medium)	Compatibility with the project	Sensitivity class		
					Low to None	Medium	High
				<ul style="list-style-type: none"> <li>- displacement of certain animal species;</li> <li>- the reduction of the vegetation cover, both quantitatively and qualitatively, due to illegal logging;</li> <li>- a strong decrease in potential, with the presence of quarries, especially in classified areas due to the presence of a subsoil rich in minerals and materials (Central Zone);</li> <li>- disappearance of natural woody formations;</li> <li>- a slight decline in forest formations with the extension of agricultural perimeters and the exploitation of wood.</li> </ul> <p>NB: In view of this situation, the project will have to take the necessary measures to avoid, as far as possible, the project being located in sites with high biodiversity potential.</p>			
	- Fight against the advancement of the	Some departments in the study area are increasingly threatened by the salinization of farmland. Some valleys have already been		The implementation of the project components must be carried out without choosing arable land. This should be a criterion for selecting the sites.			

Topic	Issues	Features of the project area	Level of challenge (high, low, medium)	Compatibility with the project	Sensitivity class		
					Low to None	Medium	High
<b>Soil resources</b>	salty tongue - Silting of arable land	abandoned by farmers because of the salinisation phenomenon.  Following the example of salinisation, some valleys, affected by the phenomenon of water erosion, are being invaded by sand making it almost impossible to farm certain agricultural areas.	<b>High</b>				<b>X</b>
<b>Water resources</b>	Preservation of water quality	The hydrological and hydrogeological characteristics in the different target areas are given in the basic environmental conditions. The enormous potentialities are tempered by a progressive degradation due to the advance of the salt tongue.	<b>Low</b>	The project will not be a major source of water pollution although the risks exist but are low with accidental pollution foreseeable during the works.	<b>X</b>		

## CHAPTER 5: SOCIO-ECONOMIC PROFILE OF THE INTERVENTION AREA

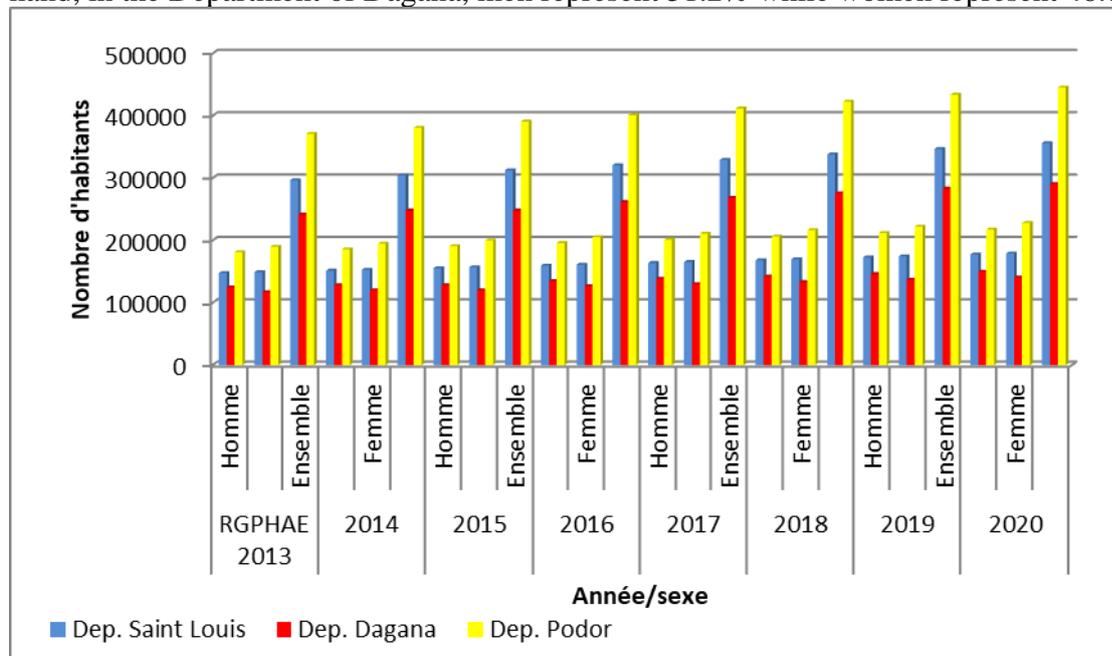
### 5.1. Demographic situation of the targeted departments

#### 5.1.1. Population trend

##### 5.1.1.1. North Zone

The population of the targeted departments in the North zone is estimated at 1,091,740 inhabitants in 2020 against 908,942 inhabitants in 2013. The Department of Podor represents the largest population of the area with 41% of the total. It is followed by the Department of Saint Louis with 33%. The department of Dagana represents 27%. The annual growth rate in the central zone is 2.7 on average.

According to gender, there is a slight dominance of women in the North zone (50.1 versus 49.9%). This phenomenon is noted in the departments of Saint Louis and Podor. On the other hand, in the Department of Dagana, men represent 51.2% while women represent 48.8%.



**Figure 8 :** Evolution of the population by zone and by gender in the targeted departments in the North zone

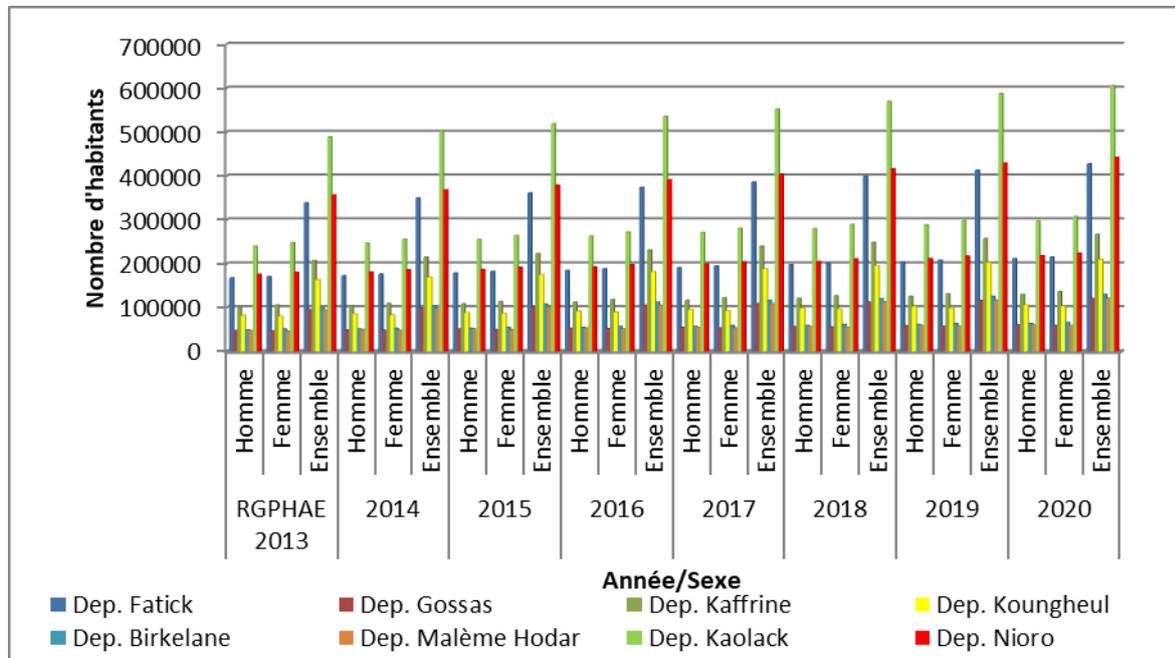
**Source :** ANSD

##### 5.1.1.2. Central Zone

In 2013 the population of the targeted departments was 1,847,638 inhabitants. In 2019, it is estimated at 2,326,121 inhabitants, including :

- - 26% are in the Department of Kaolack;
- - the 19 and 18% are respectively in the Departments of Nioro and Fatick;
- - 11% are in the Department of Kaffrine.
- - the less than 10% are in the other departments.

According to gender, women are dominant in the central zone 50.5 versus 49.5%. By department, women are dominant everywhere except in Gossas, Koungeul and Malème Hodar. In all cases, the differences are not significant. The population growth rate varies between 3.1 and 3.6.



**Figure 9 :** Evolution of the population by zone and by gender in the targeted departments in the Central zone / **Source :** ANSD

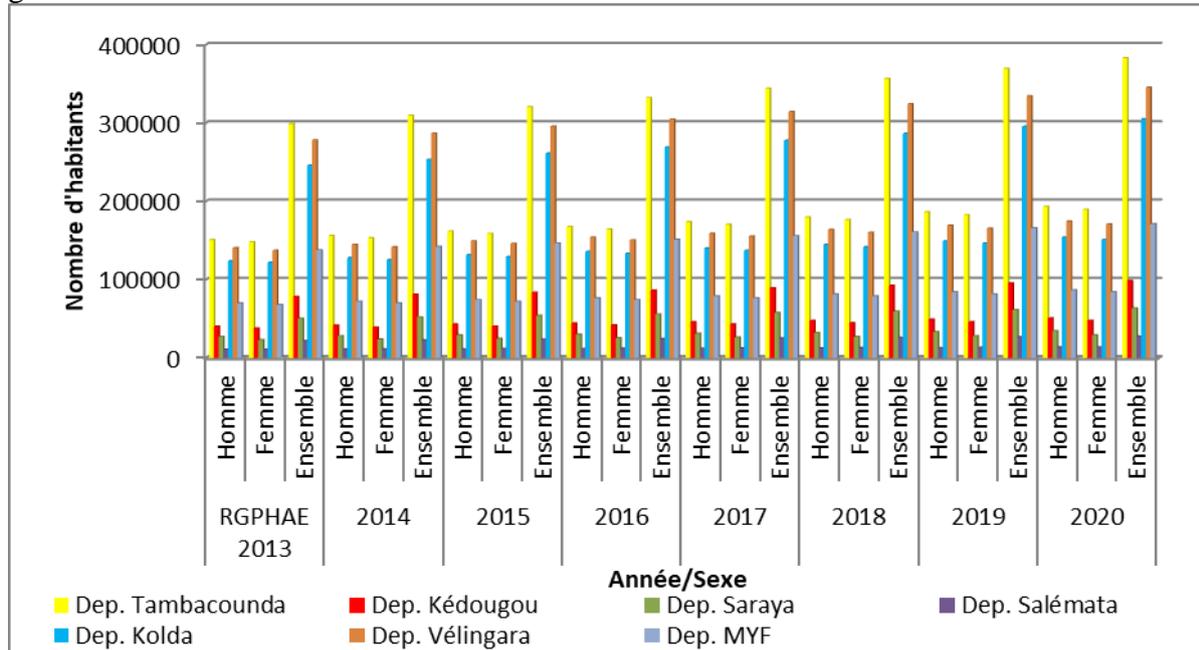
### 5.1.1.3. South-East Zone

In the southern zone, in 2013, the population of the targeted departments was 1,112,976 inhabitants. In 2019, it is estimated at 1,395,475 inhabitants, including :

- - 27 and 25% respectively in the departments of Tambacounda and Vélingara;
- - 22% in the department of Kolda;
- - 12% in the department of Medina Yoro Foula;
- - 7% in Kédougou;
- - 5% in Saraya;
- - 2% in the Department of Salémata.

According to sex, men are dominant in the South-East zone with 50.8% versus 49.2%. This logic (male dominance) follows all the departments in the zone except Salémata where women dominate with 50.6%. In all cases, the differences are not significant. The population

growth rate varies between 3.1 and 3.6.



**Figure 10 :** Evolution of the population by zone and by gender in the targeted departments in the South zone / **Source :** ANSD

## 5.1.2. Population density

### 5.1.2.1. North Zone

The population density is higher in the department of Saint Louis with more than 400 inhabitants/km<sup>2</sup>. The other departments in the area show lower densities:

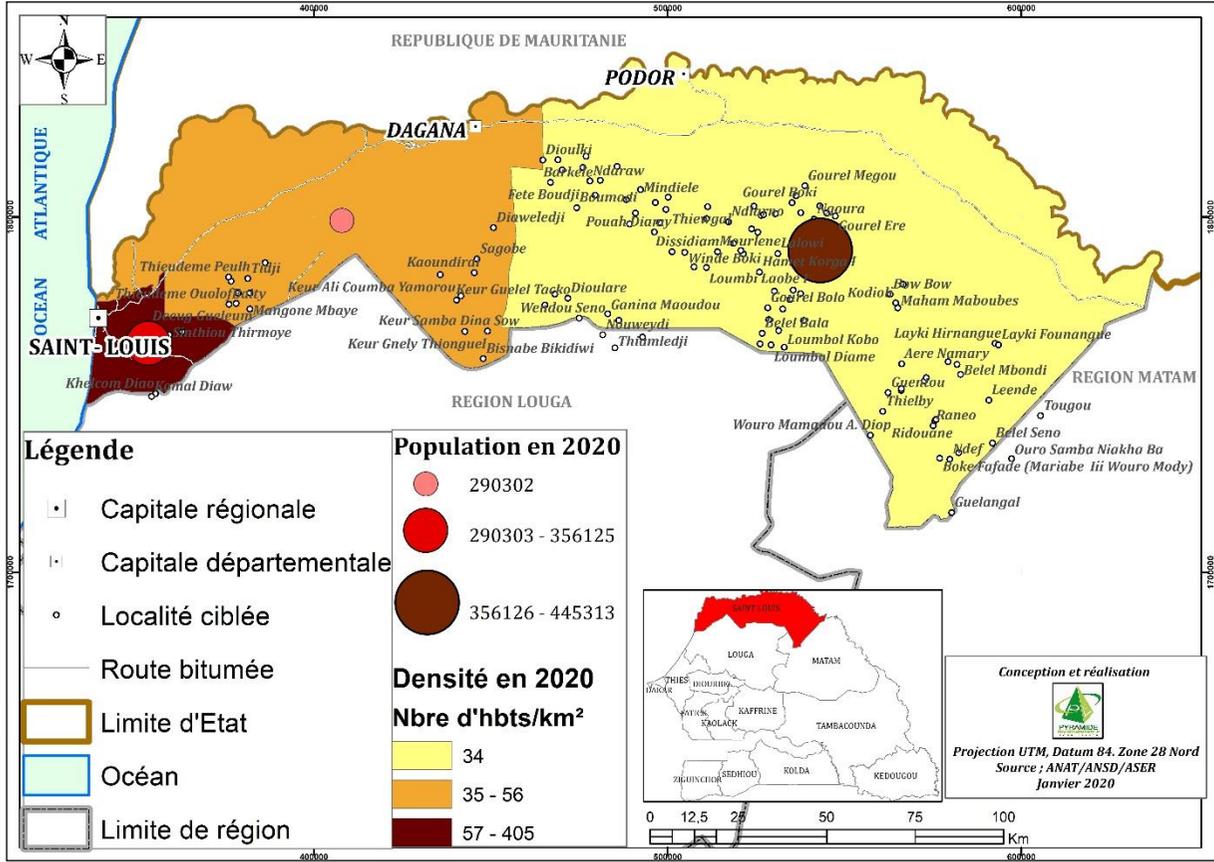
- Dagana with 56 inhabitants/km<sup>2</sup>
- Podor with 34 inhabitants/km<sup>2</sup>.

### 5.1.2.2. Central Zone

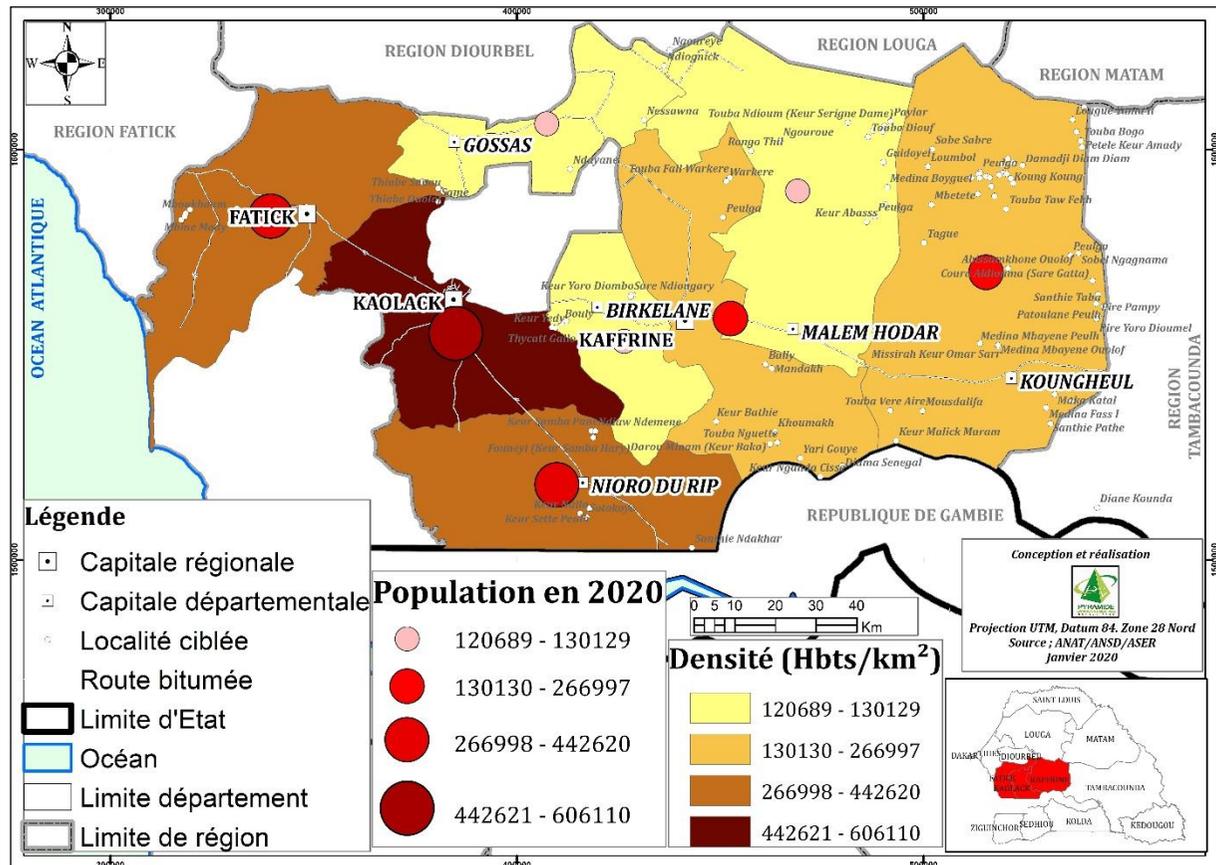
The density of the departments in the central zone is between 39 and 321 inhabitants/km<sup>2</sup>. The Departments of the Kaolack Region are more densely populated with 321 inhabitants/km<sup>2</sup> for Kaolack and 192 inhabitants/km<sup>2</sup> for Nioro. The Departments of the Region of Fatick have densities varying between 162 inhabitants/km<sup>2</sup> for Fatick and 112 for Gossas. The targeted departments in the regions of Kaffrine have densities below 100 inhabitants/km<sup>2</sup> except for Birkelane (116 inhabitants/km<sup>2</sup>).

### 5.1.2.3. South-East Zone

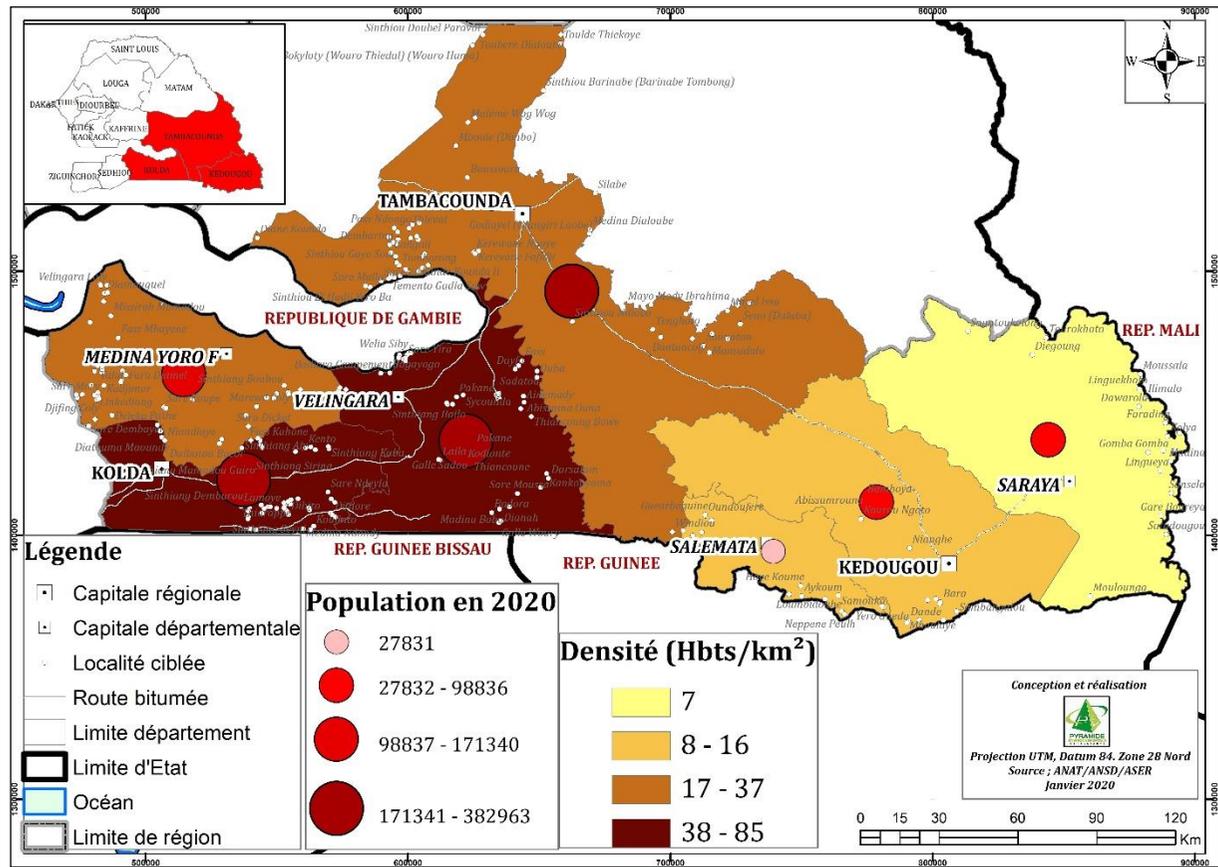
Densities range from 7 to 85 inhabitants/km<sup>2</sup>. The highest densities are found in the departments of Kolda, Vélingara and Medina Yoro Foula with respectively 85, 64 and 37 inhabitants/km<sup>2</sup>. Then comes the Department of Tambacounda with 28 inhabitants/km<sup>2</sup>. The other departments have less than 17 inhabitants/km<sup>2</sup> and these are the departments of the Kédougou region.



**Figure 11 : Population and density of the targeted departments in the North zone**



**Figure 12 :** Population and density of the targeted departments in the Central zone



**Figure 13 :** Population and density of the targeted departments in the South-East zone

**Tableau 3 : Summary of the estimated population in the Study Area**

Zone	Population Dép. ciblés	Densité	Population des villages ciblés	Part Village/zone
Zone Nord	1091740	165	21310	2
Zone Centre	2326121	136	32893	1
Zone Sud-Est	1395475	36	61416	4
<b>Zone d'étude</b>	<b>4813336</b>	<b>112</b>	<b>115619</b>	<b>2</b>

### 5.1.3. Age breakdown

#### 5.1.3.1. North Zone

In the Saint Louis Region, namely the departments of Saint Louis, Dagana and Podor, the distribution of the population by age category is as follows:

- - 49% of the population is under 20 years old.
- - the under-25s account for 60%, which attests to the youthfulness of this population
- - the over-60s represent 6% of the population.

#### 5.1.3.2. Central Zone

In the targeted departments in the Fatick Region, half are under 15 years old and 2/3 are under 25 years old. On the other hand, those aged 60 and over represent 5.49% of the population, a proportion comparable to that observed in the same age group at the national level (5.22%).

The Departments of Kaolack and Nioro, like the region, are characterized by extreme youth. The shape of the pyramid refers to the typical structure of populations with high fertility and mortality. Indeed, the rapid narrowing of the pyramid at older ages reflects the low proportion of elderly people in the total population of the Kaolack region, but also the extreme youthfulness of the latter.

The departments of the Kaffrine Region have relatively young populations. The number of births is high and the pyramid becomes more refined as age increases due to mortality. As a result, there is a preponderance of under-15s and a small minority of over-65s. In fact, nearly half of the population of the Kaffrine region, 48.8%, is under 15 years of age, while those under 25 years of age make up 67.3%. The elderly (65 years and over) make up 3.2% of the regional population and people of working age (15-64 years) make up 47.9% of the total. The fertile ages (15-49 years) correspond to 42.1% of the regional population, while the 15-24 age group, generally characterized by people looking for their first job, constitutes 18.5% of the population.

#### 5.1.3.3. South-East Zone

In the targeted department of the Tambacounda Region, the high youthfulness of the population is reflected in the average and median age as noted in the Tambacounda Region. Indeed, the

	<b>RURAL ELECTRIFICATION PROJECT IN SEVEN (07) ADMINISTRATIVE REGIONS IN          SENEGAL (<i>Kaffrine, Kaolack, Fatick, Kolda, Kédougou, Tambacounda et Saint-Louis</i>)</b> <b>Environmental and Social Impact Assessment Report</b> <i>(Preliminary Report)</i>	<b>Provisional          version</b> 22/03/2020
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average age of the population is 21 compared to 22.9 at the national level. In addition, half of the population is under 17 years of age.

In the Kédougou Region, for the targeted departments in the study area, the population is relatively young. Half of the population is under 17 years of age. The active population represents 50% of the population (between 15 - 64 years old).

The departments in the Kolda region, as in the previous ones, are strongly dominated by youth. The 10-19 age group accounts for 24%. The share of people of working age is estimated at 50%.

In general, it can be said that the population of the study area is relatively young and the working population is around 50%.

## **5.2. Economic activities of the targeted departments in the study area**

### **5.2.1. Agriculture**

#### **5.2.1.1. North Zone**

The Saint Louis region has an agriculture that is the basis of economic life. It occupies a large part of the active population. Various crops such as rice, tomatoes, onions, potatoes, corn among others are cultivated in this region.

#### **5.2.1.2. Central Zone**

→ **The departments of the Kaolack Region** are mainly agricultural: 65% of the working population is engaged in agriculture. Crops are diversified: industrial crops are groundnut, cowpea, cassava, watermelon, sesame. Cereals are "souna" millet, sorghum, maize, rice, fonio, and market garden crops (onion, cabbage, salad, peppers, eggplant, okra, parsley, carrot, etc.).

→ **The Departments of the Kaffrine Region:** agriculture employs 75% of the active population. Moreover, Kaffrine is the first groundnut producing region of Senegal with 21.7% of the national production. The main food crops are millet, sorghum, maize, etc. Cash crops are groundnuts, cotton, cassava, cowpea, watermelon. The following table shows the cultivated areas, yields and production of the main crops in the region. Vegetable crops (tomato, okra, aubergine, bissap, squash, onions, cabbage, potato, green beans, etc.) and rice are also grown in the region. These activities are developing with the creation of water reservoirs. These infrastructures put in place have enabled the creation of several agricultural farms and market gardening perimeters in the lowlands throughout the region.

#### **5.2.1.3. South-East Zone**

→ **Department of Tambacounda:** Agriculture is an important activity. It employs a large part of the active population. This can be explained by the climatic conditions, particularly the good rainfall. The main crops are: groundnuts, cotton, maize, sorghum, manioc, fonio, millet, cowpea, rice.

→ **Departments of Kédougou, Saraya and Salémata:** Agriculture in this area occupies 69% of households as it is one of the country's wettest areas. Crops are diversified: industrial crops are groundnuts, cotton and cowpeas. Cereals are sorghum, maize, rice, and market garden crops (onion, cabbage, salad, peppers, eggplant, okra, parsley, carrot, etc.). This agriculture is more oriented towards personal consumption. The industrial crop is cotton with the presence of SODEFITEX in the region. Market gardening and arboriculture is also practiced in the area near the rivers. Agriculture is the main activity and the almost exclusive means of subsistence for all families. Agricultural development is focused on two cash crops, cotton and groundnuts, as well as on food crops, mainly maize, sorghum, rice and fonio. The land is mainly worked manually; farmers in the area practice fallow and crop rotation.

→ **Departments of Kolda, Vélingara and Medina Yoro Foula:** the targeted area in the Kolda Region has favourable conditions for agriculture, invaluable arable land, the rainiest areas in Senegal, a strong rurality. This area also benefits from the State's accompanying measures for the rural world as part of the revival of agriculture as a driving force for economic and social development. The combination of all these factors has made it possible to record significant agricultural production for both food crops and industrial crops.

Generally speaking, agriculture occupies an important place in the targeted departments. The products vary according to the zones as well as in terms of cultivated areas and production.

**Table 13:** Agricultural situation in the regions of the study area for the 2018-2019 agricultural season

PRODUIT	INDICATEUR	ZONE NORD	ZONE CENTRE	ZONE SUD	ZONE D'ETUDE
MIL	SUP (Ha)	2487	465651	89957	558095
	RDT (Kg/Ha)	240	1 208	699	716
	PROD (T)	597	554 229	94 265	649091
SORGHO	SUP (Ha)	9 100	83 653	85 827	178580
	RDT (Kg/Ha)	658	1062	1679	1 133
	PROD (T)	5985	101407	119661	227053
MAIS	SUP (Ha)	3082	97387	95238	195707
	RDT (Kg/Ha)	3035	1879	2253	2 389
	PROD (T)	9354	184070	192342	385766
RIZ	SUP (Ha)	62693	6039	137130	205862
	RDT (Kg/Ha)	6423	1541	3400	3 788
	PROD (T)	402704	11014	401323	815041
FONIO	SUP (Ha)	0	0	1617	1617
	RDT (Kg/Ha)	0	0	466	155
	PROD (T)	0	0	1376	1376
ARACHIDE HUILERIE	SUP (Ha)	12601	554342	241093	808036
	RDT (Kg/Ha)	325	1307	1639	1 090
	PROD (T)	4095	724056	408199	1136350
COTON	SUP (Ha)	0	594	21142	21736
	RDT (Kg/Ha)	0	126	767	298

	PROD (T)	0	225	14895	15120
NIEBE	SUP (Ha)	8492	13565	5337	27394
	RDT (Kg/Ha)	480	576	715	590
	PROD (T)	4076	7381	4027	15484
MANIOC	SUP (Ha)	2410	9226	1290	12926
	RDT (Kg/Ha)	24087	12488	7627	14 734
	PROD (T)	58050	138277	13895	210222
PASTEQUE	SUP (Ha)	7866	24087	4658	36611
	RDT (Kg/Ha)	11750	23130	9375	14 752
	PROD (T)	92426	626248	67832	786506
SESAME	SUP (Ha)	0	21677	3186	24863
	RDT (Kg/Ha)	0	460	230	230
	PROD (T)	0	10928	2200	13128

*Source* : DAPSA/MAER

## 5.2.2. Livestock

### 5.2.2.1. Species Present in the Study Area

**Table 14** : Species Present in the Study Area

Zones	Targeted Departments	Species Present
<b>Nord</b>	<ul style="list-style-type: none"> <li>- Saint Louis</li> <li>- Dagana</li> <li>- Podor</li> </ul>	<ul style="list-style-type: none"> <li>- Cattle</li> <li>- Small ruminants (sheep and goats)</li> <li>- Equines</li> <li>- Asins</li> <li>- Camelins</li> <li>- Pigs</li> <li>- Poultry</li> </ul>
<b>Centre</b>	<ul style="list-style-type: none"> <li>- Fatick</li> <li>- Gossas</li> <li>- Kaolack</li> <li>- Nioro</li> <li>- Kaffrine</li> <li>- Koungeul</li> <li>- Birkelane</li> <li>- Malème Hodar</li> </ul>	<ul style="list-style-type: none"> <li>- Cattle</li> <li>- Small Ruminants (sheep and goats)</li> <li>- Equines</li> <li>- Asins</li> <li>- Pigs</li> <li>- Poultry</li> </ul>
<b>Sud-Est</b>	<ul style="list-style-type: none"> <li>- Tambacounda</li> <li>- Kédougou</li> <li>- Saraya</li> <li>- Salémata</li> <li>- Kolda</li> <li>- Vélingara</li> <li>- Médina Yoro Foula</li> </ul>	<ul style="list-style-type: none"> <li>- Cattle</li> <li>- Small Ruminants (sheep and goats)</li> <li>- Equines</li> <li>- Asins</li> <li>- Pigs</li> <li>- Poultry</li> </ul>

### 5.2.2.2. Livestock estimates

The livestock population in the study area is estimated at over 1,400,000 cattle, plus 500,000 small ruminants. Equines and asins are estimated at over 276,000 head and pigs at over 100,000 head. Camels are the least important with about 4000 heads. Traditional poultry is around 4,700,000 head. This shows that small ruminants are more important in the area. For poultry, its share is 40% in the study area. Cattle follow with 12%, equines, maggots and pigs are at 1% each and camels at less than 1%.

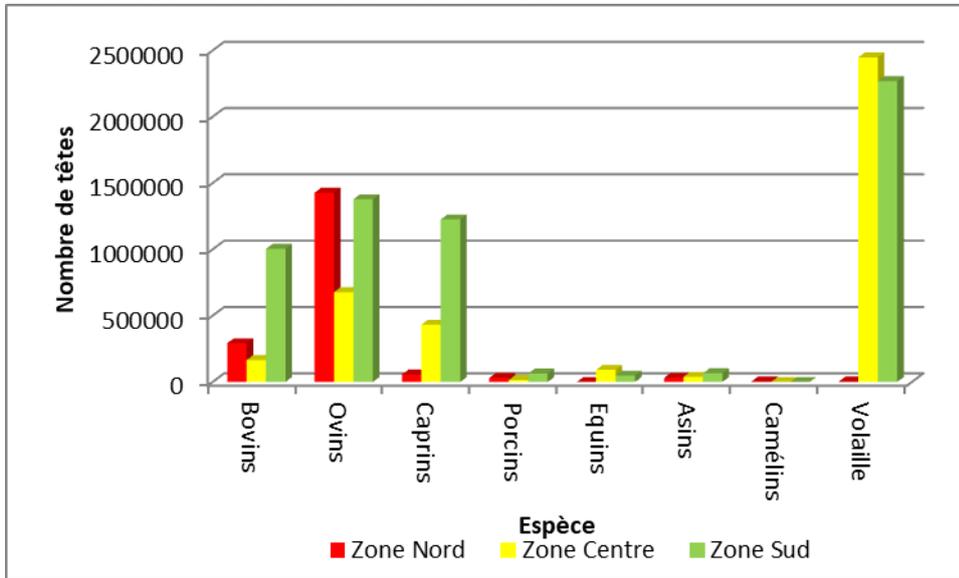
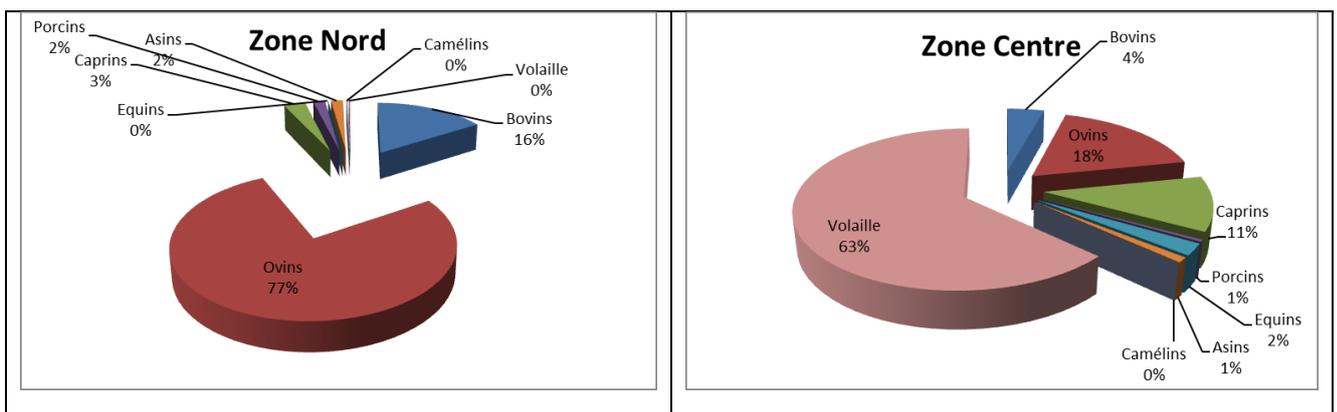


Figure 14 : Livestock Distribution in the Study Area in 2016

### 5.2.2.3. Distribution of livestock by zone

For the distribution of livestock in the study area, species vary spatially. Sheep are more present in the northern zone. In the central zone, poultry predominates, followed by sheep. The same phenomenon is noted in the southern zone. Indeed, poultry is more important with 37% of the livestock.



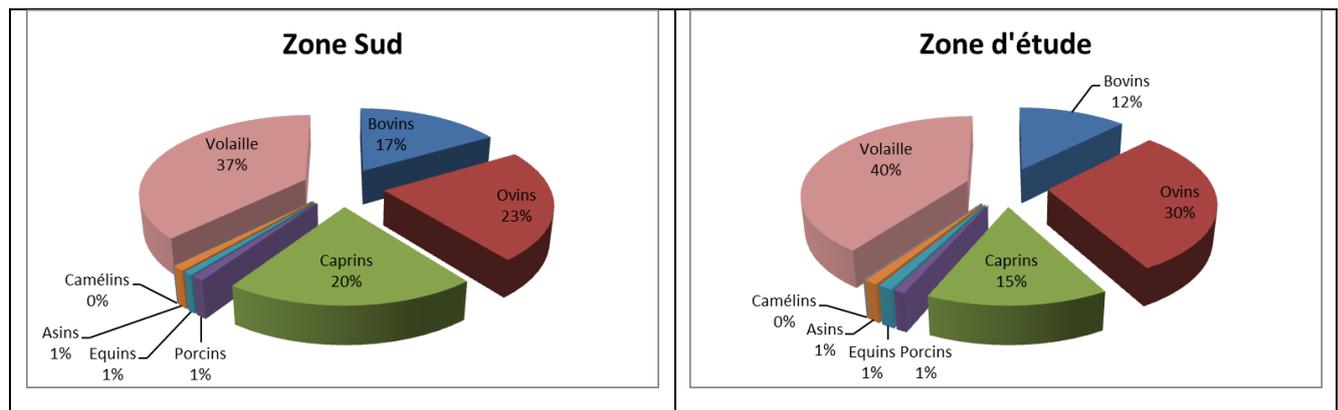


Figure 15 : Livestock distribution in target areas

#### 5.2.2.4. Transhumance

Farming in the study area is predominantly extensive. This involves transhumance of livestock to grazing and water areas. This transhumance takes place from north to south, hence the existence of cattle grazing corridors.

#### 5.2.3. Fisheries

Fishing is present in the coastal zone and in some rivers. As regards sea fishing, it concerns the regions of Saint Louis and Louga in the Northern Zone and part of the central zone (Kaolack). For inland fishing, it is found in the departments crossed by permanent waterways.

Table 15 : Characteristics of the Fishery in the Study Area

Zones	Dép.	Type de pêche	Groupes zoologiques	Infrastructures
Nord	Saint Louis Dagana Podor	Maritime et continentale	- Poissons - Mollusques - Crustacés	- Quai de pêche - Complexes frigorifiques - Fabriques de glaces - Marchés aux poissons - Usines de transformation
	Kaolack Fatick	Maritime et continentales	- Poissons - Mollusques - Crustacés	- Complexe frigorifique - Fabrique de glace - Marché aux poissons
Centre	Gossas Kaffrine Koungheul Nioro Birkelane Malème Hodar	Activité quasi-inexistante		
	Tambacounda Kédougou Salémata Kolda Vélingara	Continentale	Poissons	Complexe frigorifique

	Saraya			
	Médina Foula	Yoro	Activité quasi-inexistante	

#### 5.2.4. Transport

Transport in the area can be by road, sea, air or rail.

➔ **Air transport infrastructure** consists of regional aerodromes and airstrips.

**Tableau 16 : Airport infrastructure in the study area**

Zones	Localités
<b>Zone Nord</b>	- Saint Louis - Dagana - Richard Toll - Djoudj - Bango - Podor - Bogue
<b>Zone Centre</b>	Kaolack
<b>Zone Sud-Est</b>	- Kolda - Vélingara - Kédougou - Sabodala - Tambacounda - Simenti

➔ **The road infrastructure** consists of asphalt national roads (N1, N2, N4, N6, N7), asphalt or lateritic departmental roads and tracks.

➔ **Rail infrastructures** with as main lines (Dakar-Bamako).

➔ **Maritime infrastructures** with the existence of ports and landing quays.

#### 5.2.5. Tourism

The study area has, in addition to an appreciable diversity, a very high degree of authenticity of the products to be marketed, a historical past and a varied heritage. It is an area with high tourist potential. Each department has its own specificity.

##### 5.2.5.1. Région of Saint Louis

In these areas, the number of tourist accommodations is significant. There are inns, campsites and hotels. Tourist sites can be historical buildings such as the Faidherbe bridge, ecotourism with the Djoudj park, the Barbary language, cultural events such as jazz festival, Takkussanou Ndar, etc.

##### 5.2.5.2. Régions of Fatick, Kaolack et Kaffrine



The Fatick region has enormous potential for the development of tourism. Indeed, it has a diversified cultural heritage and offers a rather rich range of tourist sites constituted by the numerous rivers and "bolongs"<sup>2</sup>, the Saloum Islands, the National Park of the Saloum Delta and several other sites and historical monuments. This makes tourism occupy a place of choice in the economic fabric of the region.

The Kaolack Region: The lack of seafront means that tourism in the region is not very dynamic. However, its situation as a crossroads city makes that one finds there some receptive made up in majority of inns. In terms of culture, the region has cultural sites. Its amalgamated areas are the strong points of its tourism.

The Kaffrine area has a cultural heritage (traditional music, mind games, religious sites, etc.) and historical sites (megalithic sites, Mbeuleup tombs in Lougue, etc.) which could be exploited and developed for tourism purposes.

### ***5.2.5.3.Régions of Tambacounda, Kédougou et Kolda***

Tourism is developing thanks to the cultural and historical wealth. We find there the tourism of vision and hunting. Hunting tourism is highly developed in the area with the presence of the Hunting Interest Zone (ZIC), the KNP, and the amodified zones. For tourist infrastructures, the zone has a varied range of receptive facilities (hotels, inns, tourist campsites) with different stands but accessible to different types of clientele.

## **5.2.6. Craftmanship**

### ***5.2.6.1.Région of Saint Louis***

The handicraft sector is very present in the area due to the large influx of tourists and plays an important role in the socio-economic activity of Saint-Louis.

### ***5.2.6.2.Région of Fatick***

Crafts play a key regulatory role in socio-economic development and represent an important part of the region's economic activity. However, this sector is often overlooked in the various poverty reduction strategies despite its high potential.

### ***5.2.6.3.Région of Kaolack***

Craft activities are developed with the presence of the Chamber of Trades and a craft village.

### ***5.2.6.4.Région of Kaffrine***

Handicrafts have a lot of potential and occupy a good part of the populations of the Kaffrine Region. It constitutes a strategic sector for the equipment of agriculture and for the satisfaction of the needs of service crafts of the populations. However, in spite of the assets identified, the sector is confronted with constraints related to the lack of organization, infrastructure, insufficient financial, material and management capacities of the craftsmen. The handicraft sector also lacks promotion and visibility.

### ***5.2.6.5.Région of Tambacounda***



The craft industry in the department is rich and varied especially with the exploitation of forest products for carpentry. The most prized plant species are the Vene (*Pterocarpus erinaceus*), the Dimb (*Cordyla pinnata*), the kapok tree (*Bombax costatum*) and the Ngediane (*Anogeisus leiocarpus*).

#### ***5.2.6.6.Région of Kédougou***

Craftsmanship remains a key sector of the region's economic activity. Indeed, alongside agriculture and livestock, it employs a large part of the working population. At the institutional level, the sector is organized by the Chamber of Trades supported by some NGOs. The activities in which these craftsmen operate are production, service provision and art.

#### ***5.2.6.7.Région of Kolda***

The handicraft sector of the region is mainly oriented in the production branch. There are not many craft infrastructures in the region. There is only one craft village.

### **5.2.7. Industries and Mines in the Study Area**

The characteristics of these industries and mines vary by area.

#### ***5.2.7.1.Régions of Saint Louis***

The industrial fabric is not developed in the area. Concerning Saint Louis, there is a development of agro-industry especially in the Department of Dagana.

#### ***5.2.7.2.Région of Kaolack***

Industrial activities are mainly carried out by SONACOS, SNSSS, COPEOL, and WAO.

#### ***5.2.7.3.Région of Tambacounda***

The industrial fabric of the region is characterized mainly by its weakness. We note mainly the presence of SENELEC, SODEFITEX, bakeries, gas depots, hydrocarbon depots, service stations, sawmills or joinery-sawmills, etc.

#### ***5.2.7.4.Région of Kédougou***

In terms of mining, the region has significant mining potential. This makes it a pole of attraction for investors. The geological bedrock of the region consists mainly of Precambrian basement. These ancient terrains, commonly referred to as "Birimian formations", constitute a metallogenic province of great importance that hosts numerous deposits and showings of gold, iron, uranium, lithium, tin, molybdenum, copper, marble and nickel. Gold is the main material that is being mined both regionally and industrially. There are also the Falémé iron deposits with significant good quality reserves. Uranium showings and deposits are located in the department of Saraya.

#### ***5.2.7.5.Région of Kolda***

The industry and mining in this region is not well developed.

### 5.2.8. Trade

The importance of this commercial activity varies from area to area.

#### 5.2.8.1. North Zone

<b>Région of Saint Louis</b>	A distinction is made between informal and formal trade. Trade units classified as formal include wholesalers and semi-wholesalers, pharmacies, banks and insurance companies, service stations and hardware stores.
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#### 5.2.8.2. Central Zone

<b>Région of Fatick</b>	Trade is relatively important, but wholesale is almost non-existent. However, there are weekly markets (loumas) and permanent markets where most agricultural products are sold. Trade activity in the region is mainly characterized by consumer products.
<b>Région of Kaolack</b>	Trade is the lung of the regional economy; it is the most dynamic sector. The development of trade in the region dates back to the colonial era with the marketing of groundnuts. The geographical position of the region gives it a strategic place in trade as it is a compulsory passage to the South and South-West regions but also to neighbouring countries. Today, trade is beginning to take on new dimensions with the entry in force of Malian customers who come to stock up especially with salt.
<b>Région of Kaffrine</b>	Commercial activity is limited to domestic trade. It is entirely carried out by semi-wholesalers and retailers.

#### 5.2.8.3. South Zone

<b>Région of Tambacounda</b>	The geographical position of the Tambacounda region gives it a role as a trade platform open to the sub-region with important cross-border trade flows, at the crossroads of the Dakar-Bamako, Bissau-Bamako, and Dakar-Koundara corridors. This explains the presence of markets (permanent and weekly) throughout the region.
<b>Région of Kédougou</b>	It has permanent markets and especially weekly markets. Trade is developed there mainly thanks to forest products that are transported to other regions of the country. The types of traders are wholesalers, semi-wholesalers and retailers.
<b>Région of Kolda</b>	Trade in Kolda is dominated by small-scale retail trade concentrated almost exclusively in the permanent and weekly markets. The Kolda region is home to the weekly sub-regional market of Diaobé.



### 5.2.9. Forestry

The importance of the resources varies from North to South.

#### 5.2.9.1. *Départements of région Saint Louis*

The forested area of the Saint-Louis region is rich in exploitable resources. But exploitation is only observed in the department of Dagana. The forest resources are monkey bread, jujube fruits, firewood, Gowé, Laydour leaves, baobab leaves. There are 3 amodized zones, which attests to the richness of the wildlife in the area.

#### 5.2.9.2. *Départements of région Fatick, Kaolack and Kaffrine*

Despite its closure to logging, the area produces firewood, charcoal, and various harvesting products such as monkey bread. Wildlife harvesting in the region is encouraged by the existence of amodified areas. These amodified areas are the only tourist attraction the region has, as they develop hunting tourism.

#### 5.2.9.3. *Région of Tambacounda*

The region is located in the Sudano-Sahelian phytogeographical zones. Such a situation gives it a very important biodiversity. Forestry exploitation mainly concerns the production of charcoal, artisanal wood, firewood and harvesting products. The area contains a rich and varied fauna. The existence of this fauna is the consequence of a habitat that is well conserved in places, with secure conditions for the survival of species.

#### 5.2.9.4. *Région of Kédougou*

The region's forest production is focused on the production of wood and harvesting products. For wood production, there is charcoal, lumber, service wood. For harvesting products, they are diverse and varied, such as maad, monkey bread, etc. For the fauna, its potential is evaluated at amodiation zones. The region also has a ZIC (Falémé).

#### 5.2.9.5. *Région of Kolda*

Logging in the area is charcoal production, timber extraction, firewood, harvesting products. The fauna is very important with the presence of amodified zones.

### 5.2.10. Energy

Senegal's energy sources are biomass, which accounts for 42% of total consumption. Petroleum products account for 39%, electricity is 10%, the others represent less than 10%.

#### 5.2.10.1. *Biomass energy*

Sustainable biomass management projects are being set up.

- ➔ *PROGEDE* : its objective is to contribute to a sustainable increase in the availability of diversified domestic fuels, as well as income for the communities concerned, while preserving forest ecosystems and taking gender into account. Its areas of intervention are Tambacounda, Kédougou, Kolda, Sédhiou, Kaolack, Fatick, Matam.
- ➔ *National Biogas Program* which role is to provide a solution to the supply of alternative cooking fuel to households. It is a programme that is in line with the regional initiative



for the promotion of clean cooking, whose objective is to enable the populations of ECOWAS to have access to sustainable energy and cooking equipment in 2030.

#### 5.2.10.2. *Electricity production*

→ *Hydropower* with a very important potential.

*o The Manantali Dam: under the direction of the OMVS. This dam has an installed electrical capacity of 200 MW. Its production is shared between Senegal 33%, Mauritania 15% and Mali 52%.*

*o The OMVG Energy Project: OMVG is currently developing this energy project which includes the construction of the Sambangalou hydroelectric schemes with an installed capacity of 128 MW, on the Gambia River in Senegal, a 225 kV power interconnection line with a total length of 1677 km, etc.*

→ *Solar energy*: the country enjoys a strong sunshine over practically all its territory with an annual irradiation varying from the South-East to the North-West between 1850 and 2250 kWh/m<sup>2</sup>/year or an average of 5.7 kWh/m<sup>2</sup>/d. This potential is rather poorly exploited.

→ *Wind energy*: the wind regime in Senegal is of the order of 6 m/s on average (at 50 m from the ground) on the north-eastern coastal strip of the country, the Grande Côte (from Dakar to Saint Louis). The potential exists on this 200 km long and 50 km wide band of the Niayes, where market gardening activities are concentrated. Pumping water for irrigation and connecting villages off-grid are the two viable applications of wind energy.

→ *Rural electrification*: the PASER (Senegalese Action Plan for Rural Electrification), Horizons 2002-2022 for rural electrification is structured around three (03) complementary programmes. These programmes generally aim at providing access to energy for communities that do not benefit from a grid. The aim is to achieve :

- MV networks
- village electrification
- decentralised electrification by means of **solar mini grids**.

This programme is carried out with several partners and the country is divided into concessions.

## **CHAPTER 6: OPTIONS ANALYSIS**

The purpose of this paragraph is to present the main selection criteria studied, which made it possible to select the project presented in Chapter 2 (Project Description). These criteria include technical, environmental and regulatory concerns.

### **6.1. Choice of power generation technology**

The production of renewable energy from solar photovoltaic has many advantages. It is a technology that allows for simple assembly of equipment and a design that adapts to any type of site. The operating cost of such an installation is also low (low maintenance and servicing costs).

Moreover, during the operating phase, these installations do not cause any significant nuisance (no discharge into the natural environment or presenting pollution risks).

Finally, solar photovoltaic is a renewable energy source, whose existing technologies have a long life span.

Ultimately, solar energy is a renewable energy that does not consume fossil resources. It is produced as close as possible to the consumer, with no transport losses.

### **6.2. Choice of load-bearing structures**

There are two options for this project:

- ✓ *1st option:* the choice of fixed load-bearing structures ;
- ✓ *2nd option:* a solution of mobile supporting structures (trackers), allowing to increase the energy production per m<sup>2</sup> of installed panels.

However, the overall output for the 2<sup>nd</sup> option is not optimized due to the spacing of the upper tables, which is necessary to limit shading from one table to another. Investment and maintenance costs are also higher due to the use of moving mechanical parts.

Fixed structures, on the other hand, allow optimization of the output in terms of kWh produced per hectare of the power plant's footprint.

The fixed structure solution appears to be the most suitable for the site for technical and economic reasons.

### **6.3. Photovoltaic technology chosen**

There are several families of photovoltaic cells. Currently, the most widespread on the market are crystalline silicon cells and thin-film cells. Others exist but are at the Research and Development stage.

<b>Crystalline silicon cells</b>	They consist of thin silicon wafers <sup>3</sup> (0.15 to 0.2 mm), connected in series with each other and covered with protective glass. The three forms of silicon allow three types of technologies (monocrystalline,
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<sup>3</sup> Silicon is a very abundant chemical element, which is extracted from sand and quartz in particular.

	polycrystalline, ribbon), with different yields and costs. They represent just under 90% of the current market.
<b>Thin-film</b> cells	They are manufactured by depositing one or more semi-conductive and photosensitive layers on a support of glass, plastic, steel, etc. The most widespread are made of amorphous silicon, composed of silicon projected onto a flexible material. There are also those using cadmium telluride (CdTe), copper-indium-selenium (CIS). This technology is currently undergoing strong development, with a market share of around 10% (compared to 2% a few years ago).



**Photo 7: Polycrystalline (left) and monocrystalline (right) modules**

*(Source: photovoltaïque.info)*

The table below summarizes the main characteristics of the different photovoltaic technologies. The yield is the ratio between the solar energy captured and the electrical energy produced.

**Table 12: Characteristics of the different photovoltaic technologies**

		Yield in % (%)	Surface area in m <sup>2</sup> /KWp	Cost Constraint / m <sup>2</sup>
<b>Crystalline technologies</b>	polycrystalline silicon	12 à 15	10	+++ <sup>4</sup>
	monocrystalline silicon	15 à 18	8	++++ <sup>5</sup>
	silicon ribbon	12 à 15	10	+++
<b>Thin film technologies</b>	amorphous silicon (a-Si)	6	16	+ <sup>6</sup>
	cadmium telluride	7-10	12-16	++ <sup>7</sup>

**Source:** HESPUL, Guide MEDDTL 2011 / NCA Environnement 2016 modified by Pyramide E.C.

This table highlights the interest of crystalline technology in relation to the yield obtained. Therefore, for this project, it is proposed that crystalline technology (monocrystalline modules) be chosen, due to a better cost/performance ratio.

4 Satisfactory  
 5 Very satisfying  
 6 Unsatisfactory  
 7 Unsatisfactory

**NB:** The final technology will however be determined after detailed technical and financial studies. **ASER** will therefore decide on the final choice of panel type at a later date.

#### 6.4. Choice of the type of ground anchorage

Depending on the geotechnical quality of the terrain, two (02) types of ground anchoring can generally be considered :

- steel piles driven into the ground;
- concrete footings (or longrines).

**Photo 8:** Foundation types - driven piles (left) and concrete footing (right)



(*Source: MEDDTL Guide 2011 - NCA, 2015*)

**NB:** **ASER** will choose an anchorage according to the characteristics of the terrain.

## CHAPTER 7: ANALYSIS OF THE IMPACTS & CHALLENGES ASSOCIATED WITH THE PROJECT INTERVENTIONS

### 7.1. Positive Impacts

The implementation of the project will contribute significantly to the generation of major positive effects of various kinds.

**Table 13:** Overview of Positive Project Impacts

Positive Impacts	Enhancement of positive impacts
<i>Construction phase</i>	
Job creation and increased revenues	<ul style="list-style-type: none"> <li>- Favouring the recruitment of local labour for unskilled jobs during the works</li> <li>- Work as much as possible with local SMEs for the supply of materials and services.</li> </ul>
<i>Operation phase</i>	
The setting up of infrastructures will allow : <ul style="list-style-type: none"> <li>- improve the level of access to electricity in the area</li> <li>- to contribute to the achievement of Senegal's electrification objectives</li> <li>- to promote economic development in polarized areas</li> <li>- to promote the development of local SME/SMIs by securing the electricity supply;</li> <li>- to extend the coverage of the power grid.</li> </ul>	<ul style="list-style-type: none"> <li>- Ensure ongoing maintenance of the facilities</li> <li>- Ensure that the capacity of the mini power plants is correctly sized according to the real energy needs of the targeted communities.</li> </ul>

### 7.2. Negative Impacts

The impacts and management measures, according to the different phases of the project, are analysed below:

#### 7.2.1. Negative impacts of the project during construction

The construction and installation of PV modules and electrical works include :

- the preparation of the host site including various operations prior to the assembly of the solar power plant structures in particular:
  - Clearing of areas where vegetation is important.
  - civil engineering works with the installation of the fence
  - digging trenches for underground power grids
  - the placing of the concrete blocks.

- assembly of photovoltaic structures, connection of low voltage networks and installation of modules ;
- the electrical connection of the various installations including the wiring of modules, inverters, batteries, connection boxes, the necessary earthing, etc. ;
- the work of connecting the public lighting network and installing the lanterns.

All these activities are sources of potential impacts on the physical and human environments.

### **7.2.1.1. Impacts on air quality**

#### *7.2.1.1.1. Analysis of the problem*

The works are likely to cause very local dust emissions into the air, which will however be limited to the site area in relation to :

- excavation operations for the installation of posts ;
- the movement of trucks for the transfer of materials (removal of excavated material and rubble, supply of materials, etc.).

Sources of impact	Nature of impact	Comments
Mechanical or manual excavations due to excavation and earthworks for the installation of equipment/infrastructure	Dust lifting	Negative effects on air quality will nevertheless be localised and perceptible when passing through agglomerations over a relatively short period of time.
Frequent truck movements for the supply of equipment / infrastructure and construction materials	This traffic will lead to an increase in the release of dust and solid particles (soot, Pb, S) into the air, but also to an increase in the concentration of CO, CO <sub>2</sub> , NO <sub>x</sub> due to exhaust gas emissions.	
Earthworks related to right-of-way clearing and access road development	<ul style="list-style-type: none"> <li>- Dust lifting</li> <li>- Emissions from vehicles, equipment and machinery could contribute to increased air pollution in the project area.</li> </ul>	

In general, air quality will be affected by emissions of lateritic dust and exhaust gases generated by the movement of hoisting equipment, supply and material delivery trucks (poles, cables and various electrical equipment, etc.), etc. Emissions from vehicles, equipment and machinery could contribute to increased air pollution in the project area, which in the majority of cases is marked by the presence of unpaved runways. This phenomenon will be more perceptible when crossing conurbations.

#### *7.2.1.1.2. Management Strategy*

All measures must be taken to ensure the protection of the neighbourhood against the impacts that may result from atmospheric emissions during the work. To this end, the work will have to take into account the limitation of dust lifting by limiting the speed of the vehicles involved in the work.

<b>Air Impact Assessment Summary</b>					
	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
Without attenuation	Average	Local	Temporary	Average	<b>Average negative</b>
Mitigation measures	<ul style="list-style-type: none"> <li>- Require contractors to cover all trucks transporting construction materials (sand, gravel, etc.) during construction work.</li> <li>- Correct adjustment and maintenance of machines and implements.</li> <li>- Limit the speed of the machines/trucks involved in the work to 40 km/h when crossing unpaved roads.</li> <li>- <u>As far as possible</u>, favour manual earthworks instead of mechanical earthworks.</li> </ul>				
With attenuation	Low	Punctual	Temporary	Low	<b>Minor Negative</b>
<b>Residual impact</b>	Occasional release of dust during certain operations (bringing in equipment, clearing rights-of-way, etc.).				
<b>Receiver</b>	<ul style="list-style-type: none"> <li>- Workers on site</li> <li>- Local people</li> </ul>				
<b>Management residual impact</b>	of Wearing of PPE (dust mask, etc.) for the workers involved in the construction site				

### 7.2.1.2. Production and dispersion of refuse

#### 7.2.1.2.1. Analysis of the problem

Work on the site will potentially result in the production of waste. This waste consists mainly of :

- excavated material generated during right-of-way release work ;
- building material residues (wood, formwork iron, packaging materials, paper, cardboard, plastic, paint residues, plaster, glue, solvents, etc.).

Type of waste	Origin	Comments
Déblais	Generated by excavations and right-of-way release operations	Cuttings used as backfill
Wood, formwork iron, etc.	Masonry work	These solid wastes are likely to disperse and affect the health of the site. This waste can be assimilated to household waste.
Packaging material, paper, plastic etc.	Workcamp	

#### 7.2.1.2.2. Management Strategy

With regard to the management of construction site waste, the company awarding the contract for the works will ensure strict compliance with the specific environmental clauses jointly agreed by the parties involved. Site visits will be carried out in order to identify any shortcomings, which, if necessary, will have to be corrected.

The generation of waste (rubbish, rubble/gravel, etc.) from construction sites and its effects in terms of pollution will be controlled through the application, among others, of the following basic measures:

the waste must not be abandoned, discharged into the natural environment or burnt in the open air
they should be collected separately and valued as far as possible
Mixed waste must be stored in "all-purpose" container(s) or skips and disposed of in authorized landfills. To do so, the company may sign a contract with a waste management service provider for the disposal and rental of waste containers.

<b>Summary of waste generation impact assessment</b>					
Without attenuation	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
		Average	Local	Temporary	Average
Mitigation measures	<ul style="list-style-type: none"> <li>- Prohibit burning, dumping of waste into the natural environment</li> <li>- Establish a waste management system covering all operations aimed at reducing, sorting, storing, collecting, transporting, recovering and treating waste by appropriate methods.</li> <li>- Store the mixed waste in "all-comers" container(s) and dispose of it in authorized landfills.</li> </ul>				
With attenuation	Low	Punctual	Momentary	Low	<b>Minor Negative</b>
<b>Residual impact</b>	Point source pollution of the construction site				
<b>Receiver</b>	Working area				
<b>Management of residual impact</b>	Regularly clean the construction site				

### 7.2.1.3. Impacts on the flora

#### 7.2.1.3.1. Analysis of the problem

The project activities will not significantly affect habitats. The project does not involve cutting down trees (only brushing is planned). Indeed, among the criteria retained for the choice of sites, the absence of trees on them remains a decisive criterion.

#### 7.2.1.3.2. Management Strategy

<b>Summary of Wildlife Impact Assessment</b>					
Without attenuation	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
		Low	Local	Permanent	Average
Mitigation measures	<ul style="list-style-type: none"> <li>- Limit work to the selected rights-of-way</li> <li>- To ensure that the companies responsible for carrying out the work respect good environmental practices.</li> <li>- Seek authorization from the competent services before any deforestation operation.</li> </ul>				
<b>With attenuation</b>	Low	Local	Momentary	Low	<b>Minor to negligible negative</b>

<b>Residual impact</b>	None
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#### 7.2.1.4. Impacts on soils

The location of the plants will not significantly affect the soil. In fact, only a few local modifications can be noted around the sites where the power plants and solar panels are located, mainly related to excavation, foundation work and backfilling. These impacts will mainly manifest themselves in terms of soil compaction.

However, given the weakness of the work, **the impact can be considered minor to negligible**. Indeed, no activities requiring the use of heavy digging equipment, etc., are foreseen during the operations (digging operations will be done manually with trenches of a total length < 50m).

#### 7.2.1.5. Water Impacts

##### 7.2.1.5.1. Analysis of the problem

The impact on water resources occurs at two (02) levels:

- withdrawals for the water needs of the construction site ;
- the risks of pollution of water resources.

With regard to withdrawals for the water needs of the construction site, the impact remains minor to negligible, due to the very small scale of the construction site's water needs. Indeed, civil engineering activities requiring a water supply are limited to paving the power plant installation sites.

With regard to the risks of pollution, possible oil discharges during the works may reach and pollute the groundwater.

The impact is mainly in terms of the **risk of accidental pollution** related to :

- leakage of lubricating oil from construction machinery and equipment;
- containment losses of mobile oil storage tanks on the site ;
- spills caused by traffic accidents ;
- waste water from the cleaning of the gears.

##### 7.2.1.5.2. Management Strategy

⇒ Water supply

Care must be taken not to damage the water supply of the population. The following measures are therefore necessary:

<b>Summary of the Water Supply Impact Assessment</b>					
	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
Without attenuation	Low	Local	Permanent	Average	<b>Average negative</b>
Mitigation measures	<ul style="list-style-type: none"> <li>- Avoid water sources used by the population to supply the construction site.</li> <li>- Provide a mobile water cistern for the needs of the work.</li> <li>- Contact the hydraulic services for authorizations before any water resources are withdrawn for the needs of the construction site.</li> </ul>				
<b>With attenuation</b>	Low	Local	Momentary	Low	<b>Minor to negligible negative</b>

<b>Residual impact</b>	None
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⇒ Accidental pollution risks

In order to limit any risk of accidental pollution linked in particular to the operation of construction site machinery, the company in charge of the work must implement the following measures:

<b>Summary of the impact assessment related to the pollution of water resources</b>					
	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
Without attenuation	Low	Local	Permanent	Average	<b>Average negative</b>
Mitigation measures	<ul style="list-style-type: none"> <li>- Installing a device for recovering water from washing and preparation of concrete and mortars</li> <li>- Install retention bins under fuel drums and other dangerous or polluting products.</li> <li>- Require maintenance certificates for construction equipment and vehicles</li> <li>- Equipping the fueling pumps of construction machines with an automatic shut-off device</li> <li>- Store sorbent products (sawdust, sheets and booms with the property of absorbing hydrocarbons) on site in order to contain any accidental pollution which may contaminate the soil or water resources in the area.</li> <li>- Strictly prohibit the washing of machines outside dedicated areas.</li> </ul>				
<b>With attenuation</b>	Low	Local	Momentary	Low	<b>Minor Negative</b>
<b>Residual impact</b>	Accidental pollution				
<b>Location of impact / Receiver</b>	Working area				
<b>Management of residual impact</b>	<ul style="list-style-type: none"> <li>- Regularly clean storage areas as well as work areas</li> <li>- Put in place a management plan for accidental pollution.</li> </ul>				

### 7.2.1.6. Socio-economic impacts

#### 7.2.1.6.1. Analysis of the problem

The implementation of the project will require a buffer zone of at least 50 m, within which no activities are permitted, and which will have to be systematically maintained and cleared to avoid the development of tall grass that could promote the spread of a fire. In addition, the project will require access and roads. However, given the land use in the areas to be electrified, the rights-of-way could be occupied by various human activities, including agricultural activities.

More specifically, the impacts are as follows:

- temporary loss of use of agricultural land due to the opening of tracks and the installation of the construction site
- Loss of use of agricultural land due to the installation of the power plant and its auxiliaries (solar panels);
- losses related to the development of parcels of land due to the opening of access roads on agricultural land.

These activities could reduce the amount of land available for cultivation and may interfere with the development of agricultural land. The main negative impact expected is the loss of

	<b>RURAL ELECTRIFICATION PROJECT IN SEVEN (07) ADMINISTRATIVE REGIONS IN SENEGAL (Kaffrine, Kaolack, Fatick, Kolda, Kédougou, Tambacounda et Saint-Louis)</b> <b>Environmental and Social Impact Assessment Report</b> <i>(Preliminary Report)</i>	<b>Provisional version 22/03/2020</b>

land, located within the project's right-of-way (right-of-way and sites of the power plants and solar panels).

#### 7.2.1.6.2. Management Strategy

<b>Summary of the impact assessment on socio-economic activities</b>					
	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
Without attenuation	Low	Local	Permanent	Major	<b>Major Negative</b>
Mitigation measures	<ul style="list-style-type: none"> <li>- Aiming first and foremost at marginal land (if geotechnical soil characteristics permit) for the installation of mini power plants and related infrastructures.</li> <li>- Provide compensation for impacted activities</li> <li>- Begin work taking into account the cultural calendar.</li> </ul>				
<b>With attenuation</b>	Low	Local	Momentary	Low	<b>Minor Negative</b>
<b>Residual impact</b>	Loss of resources and livelihoods				
<b>Location of impact / Receiver</b>	Farmers and Local People				
<b>Management of residual impact</b>	Post-compensation accompaniment				

#### 7.2.1.7. Risk of conflicts for the employment of local labour force

##### 7.2.1.7.1. Analysis of the problem

The works will potentially require local labour, which will be a potential source of increased local income and unemployment.

On the other hand, the non-use of local labour during the work could lead to frustration or conflict, given the high unemployment rate in the project areas, which could hamper the smooth progress of the work.

##### 7.2.1.7.2. Management Strategy

This risk can be avoided by inviting companies in their contractual clauses to give preference to local recruitment, particularly of unskilled labour. This would allow a better appropriation of the infrastructures.

<b>Summary of the impact assessment of the potential for conflict on local labour employment</b>					
	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
Without attenuation	Forte	Local	Momentary	Major	<b>Major Negative</b>
Mitigation measures	<ul style="list-style-type: none"> <li>- Recruiting local labour for unskilled jobs as a priority</li> <li>- Inform &amp; sensitize the population on the employment opportunities related to the project.</li> <li>- Display recruitment criteria.</li> </ul> <p><b>NB: In</b> parallel with the work, the project integrates in partnership with the GiZ a training programme for 900 people with at least 02 people in each village in order to establish skills in the region and create jobs (maintenance, cleaning, residential installation, etc.).</p>				
<b>With attenuation</b>	Forte	Local	Momentary	Major	<b>Major positive</b>
<b>Residual impact</b>	None				

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### 7.2.1.8. Cultural sites and classified heritage

#### 7.2.1.8.1. Analysis of the problem

On the cultural level, there are classified monuments, cultural sites, historic or cultural places in the project area which are likely to be disturbed by the project activities if safeguarding measures are not taken. In the case of as yet unknown archaeological sites, there is a risk of deterioration during the excavation of the foundations for the infrastructures and the opening of access roads.

#### 7.2.1.8.2. Management Strategy

<b>Summary of the impact assessment on cultural and listed heritage sites</b>					
	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
Without attenuation	Forte	Local	Momentary	Major	<b>Major Negative</b>
Mitigation measures	<ul style="list-style-type: none"> <li>- Deviate from the emblematic sites identified during the implementation of the project.</li> <li>- Limit work to the selected rights-of-way</li> <li>- Identify, mark out and secure all the historic monuments within 200 m of the works.</li> <li>- Protect any cultural property, discovered by chance, during the work and establish a procedure for the removal of the found object (in case of discovery).</li> <li>- Raise awareness among the staff in charge of work on historic sites and monuments and their identification.</li> </ul>				
<b>With attenuation</b>	Low	Local	Momentary	Low	<b>Minor Negative</b>
<b>Residual impact</b>	None				

### 7.2.1.9. Early deterioration of infrastructure

#### 7.2.1.9.1. Analysis of the problem

The project infrastructure may be affected by natural phenomena related to the biophysical and environmental context of the areas crossed (gullies or bush fires). Indeed, the project area is prone to water erosion problems (mainly in the Centre-East zone) and bush fires. As a result, project facilities may be exposed to these climatic hazards.

#### 7.2.1.9.2. Management Strategy

<b>Summary of the impact assessment on early infrastructure destruction</b>					
	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
Without attenuation	Forte	Local	Momentary	Major	<b>Major Negative</b>

<b>Mitigation measures</b>	<ul style="list-style-type: none"> <li>- Have the installations / works certified</li> <li>- Monitoring compliance with the technical clauses contained in the DAOs</li> <li>- Move the installations away from unstable areas to avoid gullies and risk of rock fall.</li> <li>- Select qualified companies</li> <li>- Ensure the project management of the works, by a qualified company</li> <li>- Putting in place guarantee clauses for installations</li> <li>- Apply construction, control and certification standards by all parties involved in the works</li> <li>- Validate the choice of construction and operating materials, after carrying out the required laboratory tests.</li> </ul>				
<b>With attenuation</b>	Low	Local	Momentary	Low	<b>Minor Negative</b>
<b>Residual impact</b>	Occasional destruction of facilities				
<b>Management of residual impact</b>	<ul style="list-style-type: none"> <li>- Inspect the infrastructure periodically to detect any damage.</li> <li>- Periodic maintenance of infrastructure.</li> </ul>				

### 7.2.1.10. Risk related to construction site accidents

#### 7.2.1.10.1. Analysis of the problem

The construction phase consists of the preparation and construction of the necessary infrastructure and the installation of the mini power plants and their ancillary components (photovoltaic panels, etc.).

The risks associated with this work are mainly :

- risk of injury during brushcutting operations ;
- general risks of occupational accidents and diseases. These are caused by: falls from height, injuries and fractures, shocks, knocks, cuts and sections, nail bites from nails on pieces of wood, hand injuries during the laying of electrical conductors, impalements on rebar;
- the risk of crushing due to the accidental fall of material suspended from a crane when it is being installed;
- traffic risks with the presence of excavations for the installation of electric cables and EP poles;
- the risk of electrocution during the installation and testing of electrical installations and connections to the various interfaces.

#### 7.2.1.10.2. Management Strategy

The company in charge of the works will have to set up a safety plan for the management of the risks on the building site. This plan will describe the main actions envisaged to deal with an accident situation. In accordance with labour regulations, the wearing of PPE is compulsory for all persons frequenting the worksite.

Depending on the nature of the work, the main PPE required for civil engineering are :

Helmets

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Gloves
Safety footwear
Knee pads
Harness: for work at height
Apron and goggles: for welding work

In addition, due to the presence of snakes in the project area with the risk of bites when the rights-of-way are released, it is necessary for the companies to provide first aid kits with doses of anti-venom serum and the site foreman's authorization on emergency measures to be taken in the event of an accident before evacuation to the health structures in the area.

<b>Summary of worker impact assessment</b>					
	Intensity	Scope	Duration	Importance	Status
Without attenuation	Forte	Local	Temporary	Major	<b>Major Negative</b>
Mitigation measures/ Improvement	<ul style="list-style-type: none"> <li>- Display safety instructions on the construction site</li> <li>- Wear PPE (gloves, safety shoes, etc.).</li> <li>- Regular maintenance of the equipment</li> <li>- Limiting the speed of the machines and trucks involved in the work</li> <li>- Securing the manoeuvring areas of the machines</li> <li>- Securing the loads handled, recording the equipment and machinery before intervention</li> <li>- Train operators/drivers to drive safely</li> <li>- Train staff in handling</li> <li>- Limit manual handling to workstations</li> <li>- Clean and maintain work platforms</li> <li>- Marking risk areas</li> <li>- Limit the length of extension cords</li> <li>- Backfill the excavation</li> <li>- Make site personnel aware of safety measures</li> <li>- Provide field teams with first-aid kits with doses of anti-venom serum</li> <li>- Train the site foreman on the emergency measures to be taken in the event of an accident.</li> </ul>				
<b>With attenuation</b>	Low	Punctual	Momentary	Low	<b>Minor Negative</b>
<b>Residual impact</b>	Occasional minor accidents				
<b>Receiver</b>	Workers on site				
<b>Management of residual impact</b>	<ul style="list-style-type: none"> <li>- Raising awareness of site personnel on safety measures :</li> <li>- Continuous inspection of the construction site and work areas.</li> </ul>				

### 7.2.2. Operation phase

The potential negative impacts expected here are more related to the operation and maintenance of mini-solar power plants and generators.

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With regard to maintenance operations, in the case of ground-mounted photovoltaic power plant installations in fixed technology, the main curative maintenance tasks are as follows:

- possible cleaning of the solar panels. Indeed, the operator will carry out washing operations, the frequency of which will depend on the soiling observed on the surface of the photovoltaic panels.
- cleaning and electrical checks of inverters, transformers and junction boxes
- Replacement of any defective elements (structure, panel, etc.).
- the punctual replacement of electrical elements as they age
- checking for abnormal connections and overheating.

These different phases could be at the origin of impacts on the environment, these impacts are dealt with below.

#### ***7.2.2.1. Negative impacts of solar power plants***

In terms of technological risks, the solar photovoltaic system is the safest under normal operating conditions. In addition, the almost permanent absence of operating personnel reduces the probability of an accident occurring through direct or indirect contact with electrical structures. In addition, the absence of permanent storage of chemicals and fuels during the operational phase also reduces the level of risk.

However, there are other risks associated with the presence and operation of these plants, such as :

- the risk of electric shock with the presence of electrical voltages and currents on the direct and alternating current sides
- the risk of ignition with short-circuits, arcing or surface heating if components are not properly dimensioned or maintained
- fire/explosion risk of batteries with the possibility of direct contact with sulphuric acid (corrosive and toxic liquid) ;
- the risk of malicious mischief and theft of electrical equipment/materials in the absence of a guarding and control system.

7.2.2.1.1. Strategy for managing impacts related to the power plant's electrical facilities

<b>Summary of the assessment of impacts related to solar power plants</b>					
Without attenuation	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
	Forte	Local	Permanent	Major	<b>Major Negative</b>
Mitigation measures	<p>In order to prevent any electrical risk associated with photovoltaic plants and related installations, the design and operation of the works shall provide for the following measures:</p> <ul style="list-style-type: none"> <li>- the panels and electrical components shall be equipped with DC and AC surge arresters and protection devices in accordance with the international standard IEC 61024, which is the international reference in this field;</li> <li>- the installation will be equipped with a lightning conductor whatever the level of lightning strikes in the area where the solar power plant is installed;</li> <li>- the equipotentiality of all the conductive elements and metallic masses (except for the battery bank) by means of earth connections;</li> <li>- LV electrical structures will be installed and operated in accordance with NFC 15-100 ;</li> <li>- training and certification (type B2 and BP) of the operators who must install and operate the electrical equipment of the photovoltaic system;</li> <li>- a maintenance and preventive maintenance plan with visual inspections, electrical measurements, technical room checks, and replacement of defective components.</li> <li>- For the technical room : <ul style="list-style-type: none"> <li>• it will be secure, insulated, air-conditioned and waterproof;</li> <li>• it will have 2 h fire walls;</li> <li>• The installation of the DC and AC protection boxes and the inverter must be installed at a height of more than 120 cm above the floor to make them inaccessible to children;</li> <li>• the presence of a self-contained emergency lighting unit including the mains power supply ;</li> <li>• the presence of an insulating stool and device for checking the absence of voltage and a rescue pole ;</li> <li>• Safety signs and markings (safety instructions, dangers of the system and emergency telephone numbers) ;</li> <li>• a set of personal protective equipment (PPE) in the form of electro-safety cases will be placed at the entrance to the technical room to allow intervention on the electrical structures in the event of an incident. Minimum PPE are to be provided such as: insulating helmet, anti-UV safety glasses, insulating gloves, work clothing made of fireproof material, insulating safety shoes;</li> <li>• the maintenance and periodic cleaning of the premises and the prohibition of eating and/or drinking in or near the premises will help to control rodents ;</li> <li>• Suitable and sufficient extinguishing means shall be provided for extinguishing fires of electrical origin (2 kg and 6 kg CO<sub>2</sub> extinguishers).</li> </ul> </li> </ul>				
<b>With attenuation</b>	Low	Local	Momentary	Low	<b>Minor Negative</b>

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7.2.2.1.2. *Strategy for managing the impacts associated with electricity storage batteries*

<b>Summary of Impact Assessment of Electricity Storage Batteries</b>					
Without attenuation	Intensity	Scope	Duration	Importance	Status
		Forte	Local	Permanent	Major
Mitigation measures	<p>The following measures are required to mitigate the risks associated with the operation of the batteries:</p> <ul style="list-style-type: none"> <li>- the batteries will be gelled, completely closed and delivered without external acid;</li> <li>- a retention shall be built in at each battery bank with a capacity equal to 100% of the total volume of electrolyte contained in all cells of the bank ;</li> <li>- the shielding of the battery terminals and non-insulated conductors ;</li> <li>- training of personnel in health and safety and raising public awareness of risk management ;</li> <li>- the provision of an eye washer kit for rinsing in case of accidental contact with sulphuric acid ;</li> <li>- Used batteries will not be stored in residential areas.</li> </ul>				
<b>With attenuation</b>	Low	Local	Momentary	Low	<b>Minor Negative</b>

7.2.2.1.3. *Strategy for managing the negative impacts of generators*

As a reminder, in normal operation of the generating sets, one might fear :

- noise and vibration due to the operation of the units ;
- fire hazard with the possibility of a flammable liquid spill and a fire start.

<b>Summary of the assessment of impacts related to generators</b>					
Without attenuation	Intensity	Scope	Duration	Importance	Status
		Forte	Local	Permanent	Major
Mitigation measures	<p>In order to mitigate the risks associated with the operation of generating sets, it is necessary to :</p> <ul style="list-style-type: none"> <li>- Choosing soundproof groups ;</li> <li>- Train operating personnel in health and safety and risk management ;</li> <li>- Raise awareness among the surrounding populations on the functioning of the groups and the associated risks ;</li> <li>- Provide the appropriate PPE and require it to be worn for the maintenance of the units;</li> <li>- Avoid storing lubricants and waste oils on site as much as possible;</li> <li>- Have a PS-50 type fire extinguisher and sandbox near each unit.</li> </ul>				
<b>With attenuation</b>	Low	Local	Momentary	Low	<b>Minor Negative</b>

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#### 7.2.2.1.4. Preventing the risks of malevolence and theft

<b>Summary of the assessment of the impacts of malevolent acts</b>					
Without attenuation	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
	Forte	Local	Permanent	Major	<b>Major Negative</b>
Mitigation measures	Malicious acts and vandalism can be prevented by the following measures: <ul style="list-style-type: none"> <li>- the entire photovoltaic plant will be fenced off, access will be regulated and a remote control system for the technical room will be set up</li> <li>- the technical room will remain locked and not accessible to the public for security reasons. Only dealers and ASER representatives will be allowed to enter the premises.</li> <li>- raising the awareness of the surrounding populations.</li> </ul>				
<b>With attenuation</b>	Low	Local	Momentary	Low	<b>Minor Negative</b>

#### 7.2.2.1.5. Fire safety

<b>Summary of the Fire Risk Impact Assessment</b>					
Without attenuation	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
	Forte	Local	Permanent	Major	<b>Major Negative</b>
Mitigation measures	The measures to prevent and fight against a fire outbreak are, among others, the following: <ul style="list-style-type: none"> <li>- choice of electrical equipment meeting strict technical standards and flame-retardant cables</li> <li>- no smoking in the technical room and its surroundings</li> <li>- training in the use of fire-fighting equipment ;</li> <li>- regular maintenance of the site by brushing within a 50 m radius; this will prevent the development of tall grass that could promote the spread of a fire</li> <li>- a 5 m wide fire-break strip will be maintained around the site</li> <li>- accesses and paths will be kept accessible at all times and in good traffic condition for the emergency services</li> <li>- Continuous monitoring of the plant with an alert system in case of an incident. To this end, study the possibility of setting up a remote management system at power plant level, indicating all parameters in real time.</li> <li>- Implementation of an efficient fire circuit and a fire safety plan before the plants are commissioned.</li> <li>- the personnel working in the installations must be trained in electrical risks and have a qualification adapted to the types of work carried out.</li> </ul>				
<b>With attenuation</b>	Low	Local	Momentary	Low	<b>Minor Negative</b>

#### 7.2.2.1.6. Impacts on populations (development of pests)

<b>Summary of population impact assessment (pest development)</b>					
Without attenuation	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
	Forte	Local	Momentary	Major	<b>Major Negative</b>
Mitigation measures	Establish a periodic maintenance program to avoid the development of wildlife at risk (under signs) for workers and populations (snakes, scorpions, etc.).				

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<b>With attenuation</b>	Low	Local	Momentary	Average	<b>Average negative</b>
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#### 7.2.2.1.7. Impact on water resources (change in runoff conditions)

Because of the small areas mobilized for the installation of the facilities, the project will have a nil to negligible impact on the modification of water runoff conditions. In addition, no installation will be located on slopes or areas that may cause flow disturbance (site acceptance criteria).

#### 7.2.2.1.8. Impacts on water resources (pollution risks)

Summary of water resources impact assessment (pollution risks)					
Without attenuation	Intensity	Scope	Duration	Importance	Status
	Forte	Local	Momentary	Medium	<b>Average negative</b>
Mitigation measures	In order to avoid pollution of the soil and possibly the subsoil and groundwater, the project will use cleaners based on essential oils and natural surfactants, also alcohol-free, for the maintenance of the panels.  For black water, watertight pits will have to be provided on site.				
<b>With attenuation</b>	Low	Local	Momentary	Average	<b>Minor to negligible negative</b>

#### 7.2.2.1.9. Waste Impacts

Summary of the waste impact assessment					
Without attenuation	Intensity	Scope	Duration	Importance	Status
	Forte	Local	Momentary	Major	<b>Major Negative</b>
Mitigation measures	Put in place a waste management plan with : <ul style="list-style-type: none"> <li>- the orientation of common waste to authorized landfills ;</li> <li>- the orientation of hazardous waste (used oils, used batteries and accumulators, etc. to authorized channels).</li> </ul>				
<b>With attenuation</b>	Low	Local	Momentary	Average	<b>Average negative</b>

#### 7.2.2.1.10. Risks related to maintenance operations

Summary of risks related to maintenance operations					
Without attenuation	Intensity	Scope	Duration	Importance	Status
	Forte	Local	Momentary	Medium	<b>Average negative</b>
Mitigation measures	<ul style="list-style-type: none"> <li>- Switch off the system before carrying out maintenance work.</li> <li>- Ensure that work on live wires is carried out by trained workers and in strict compliance with safety and insulation standards, where applicable.</li> <li>- Provide the operators with the necessary personal protective equipment before any intervention in electrical works, namely: insulating helmet, anti-UV safety glasses, insulating gloves, insulating safety shoes.</li> </ul>				
<b>With attenuation</b>	Low	Local	Momentary	Average	<b>Minor Negative</b>

#### 7.2.2.2.Noise pollution of installations

##### 7.2.2.2.1. Analysis of the problem

The operation of a solar power plant can be a source of noise pollution on sites due to the operation of the units.

#### 7.2.2.2.2. Management Strategy

ASER will have to insert in the technical clauses the acquisition of equipment complying with international standards.

<b>Summary of the impact assessment of noise pollution at installation level</b>					
	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
Without attenuation	Low	Local	Permanent	Average	<b>Minor Negative</b>
Mitigation measures	<ul style="list-style-type: none"> <li>- Build the power plants away from residential areas (at least 50 m from houses)</li> <li>- Cover noise source equipment (generator, etc.)</li> <li>- Soundproofing the power plants.</li> </ul>				
<b>With attenuation</b>	Low	Local	Momentary	Low	<b>Negligible</b>
<b>Residual impact</b>	Minor noise pollution				
<b>Receiver</b>	<ul style="list-style-type: none"> <li>- Operating staff</li> <li>- Local people</li> </ul>				

### 7.3. Cumulative impacts

Cumulative impacts are impacts resulting from the addition of a project's impacts to those of existing projects, future projects and/or projects that can be anticipated in the future. For the assessment of cumulative impacts, it is recommended that these be carried out for a region with the same environmental components. In fact, cumulative impact assessment generally applies to scenarios where two separate projects have cumulative effects on one or more components of the environment.

#### 7.3.1. Cumulative positive impacts

During the preparation and construction phases of the mini-power plants, the cumulative positive impacts are the creation of income through the temporary jobs that will be created for the benefit of local workers from the localities polarized by the works.

During the equipment operation phase, there are many positive cumulative impacts:

- improving the living conditions of rural populations through access to electricity ;
- the improvement of study conditions for pupils and schoolchildren as a result of the electrification of the localities concerned ;
- better conditions for the exercise of socio-religious activities due to the lighting and sound possibilities;
- better functioning of basic social services (health centres etc.);.
- the creation of new trades in the areas concerned (welding, metal joinery, tailoring, etc.).

These impacts will be cumulative with those of projects and programmes already active in the same sector and in the same areas (PUDC, PUMA, etc.).

### 7.4. Climate Change

The project could have a positive impact on global CO<sub>2</sub> emissions by limiting the use of fossil fuels. Indeed, solar panels do not emit CO<sub>2</sub>. Only their manufacture consumes electricity. And

generally speaking, it is recognized in the literature that a solar panel pays off its "energy debt" between 6 months and 01 years.

### 7.5. Impact on gender and poverty reduction strategies

The aim of the project is to provide electrification of the targeted localities with a view to helping the populations of rural areas to develop further by creating wealth and thereby effectively combating poverty. Indeed, the objective of the project is not only to bring electricity to the population, but should contribute significantly to wealth creation and consequently reduce or even eliminate poverty. Indeed, women in the rural world, through access to electricity, will find a great opportunity to make their activities profitable with the possibilities offered by electric current. For example, pumps powered by energy reduce all the drudgery they endure in drawing water. The socio-economic impact on people's lives, particularly on women, is more than certain. The project also creates wealth. It has strong intersectoral linkages with various socio-economic sectors (agriculture, health and education). Thus, electricity could bring about many positive changes at almost every level of the different business sectors. These include:

- the promotion of income-generating activities ;
- the acquisition of household appliances (more comfort for the population) ;
- the reduction of the harassing chores of rural women, with a consequent increase in the schooling rate of children, especially girls, and better school results;
- the development of cultural and leisure activities.

### 7.6. Decommissioning of the solar power plant

Site reclamation will take place at the end of the lease or in any circumstances that put an early end to the project (termination of the electricity contract, cessation of operations, economic disruption, etc.). All facilities will be dismantled :

- the dismantling of the support tables ;
- the removal of the technical rooms (transformer and delivery station) ;
- evacuation of cable networks, dismantling and removal of cables and sheaths ;
- the dismantling of the perimeter fence.

Dismantling at the end of the operation will be done according to the future use of the land.

<b>Summary of the impact assessment of the decommissioning phase of the plants</b>					
	<b>Intensity</b>	<b>Scope</b>	<b>Duration</b>	<b>Importance</b>	<b>Status</b>
Without attenuation	Low	Local	Permanent	Average	<b>Minor Negative</b>
Mitigation measures	Draw up a plan for the dismantling and rehabilitation of the sites, 06 months before the cessation of activities.				
<b>With attenuation</b>	Low	Local	Momentary	Low	<b>Negligible</b>



## **CHAPTER 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK PLAN**

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This chapter deals with the technical procedures for taking into account environmental and social aspects in the planning and implementation processes of mini-solar power plants.

Its specific objectives are to describe the institutional mechanisms relating to :

- a description of the environmental screening process to accurately identify the potential environmental and social impacts that may result from the project activities and the implementation of the proposed mitigation measures;
- the application of environmental and social measures ;
- monitoring the implementation of mitigation measures ;
- capacity building ;
- the related cost estimates as well as the timeline for implementation.

### **8.1.Proposal of an organizational chart**

Organizationally, in line with the recommendations of the stakeholder consultation, **ASER** shall :

#### **8.1.1. Integrate harmonization meetings at the regional level**

This integration of harmonisation meetings will allow **ASER** :

1. to make their interventions known at the level of the different targeted regions;
2. to know the interventions of the different partners and actors operating in the region and in the same sector (PUDC, PUMA, etc.);
3. harmonize their planning of interventions with those of the institutions intervening in the sector in order to avoid duplication or poor planning of activities;
4. to have the planned interventions validated by the technical services and local authorities (target localities).

**NB:** this last point remains important because during the public consultations, the technical services and local authorities drew the consultant's attention to poor planning of interventions marked by poor targeting (in some cases hamlets are targeted instead of large villages, in other cases, the targeted localities no longer exist).

#### **8.1.2. In terms of environmental and social management**

##### ***8.1.2.1.At the national level***

**ASER** will have to approach the Ministry in charge of the Environment, through the Directorate of Environment and Classified Establishments in order to establish a channel of cooperation in the form of a convention so that the latter supports them in the technical implementation of the measures of Environmental and Social Management (GES).

##### ***8.1.2.2.At the regional level***



At the regional level, **ASER** will have to rely on technical assistance from the DREECs for the operational implementation of the management plan for environmental and social safeguard measures.

Through the DEEC and the DREEC, "**ASER**" will be able to mobilize the technical services involved in the follow-up of the environmental and social management strategy (GES) of the interventions, through the Regional Committee of Environmental Follow-up (CRSE). This technical support could be done through the signature of an agreement between DEEC and **ASER** for the environmental management of the project interventions.

## **8.2.Environmental and social management measures**

The operational taking into account of the environment in the various interventions of "**ASER**" will pass by the implementation of the measures below.

### **8.2.1. Taking the environment into account in the planning phase**

In the project planning phase, "**ASER**", with the support of CED/DREEC (through the proposed agreement), will have to carry out a preliminary environmental diagnosis (including problem identification, preliminary consultations, field reconnaissance and initial summary description of the project and the host site). The objective of this diagnosis is:

- define the environmental issues associated with the host site;
- to classify the project.

#### ***8.2.1.1.Environmental and social diagnosis or preliminary screening***

Given the context of the project, marked by the construction of 1,000 mini-solar power plants in an emergency context, the environmental and social diagnosis or preliminary sorting will have to replace the environmental and social assessment procedure. Indeed, a procedure that must lead to the completion of 1,000 environmental studies in compliance with the regulations could compromise the feasibility of the project.

This approach will thus make it possible to :

- make the BPI ranking of the projects<sup>8</sup> ;
- identify projects that are likely to have adverse environmental and social impacts;
- identify the environmental measures to be applied where appropriate.

It will be carried out using the form that has been proposed in the form of a questionnaire to identify the environmental and social impacts of each project (see the preliminary screening form in Annex 2).

The process includes :

- the completion of the selection form by the DREEC with the support of "**ASER**".
- validation of the form and GHG measures by the ESRB ;
- transmission of the form to "**ASER**" via the CED.

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<sup>8</sup> As far as BPIs are concerned, solar power plants are not classified in the Senegalese nomenclature (2005 version). Only generators are classified. And at this stage of the project, details on the number of groups per locality, the power of these groups, etc. are not available.

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As a reminder, the preliminary sorting activity must take place in the presence of representatives of the project's beneficiary populations.

The results of this work should allow "ASER" to finalize the clauses and other environmental and social measures to be integrated in the DAOs with the specific measures from the preliminary screening that should complete and specify the measures proposed in chapter 7.

### ***8.2.1.2. Integration of environmental and social measures in the CAD/RRP and the ED***

"ASER" shall ensure that recommendations and other environmental and social management measures are incorporated into tender documents, requests for information and quotations, and project implementation documents.

Cost elements related to environmental and social measures should be integrated into the detailed estimates and price schedule.

Social aspects will be particularly monitored in the integration of measures in the DAO and DRP, with particular attention to the following points:

- the participation of the most vulnerable groups ;
- gender mainstreaming;
- social support measures ;
- and the like

To this end, the grid for analysing the technical offers will have to include an environmental criterion in the scoring, taking into account the environmental and social measures proposed in the methodology of intervention by the companies.

## **8.2.2. General environmental management measures during the construction phase**

### ***8.2.2.1. Regulatory Measures***

The start of the work should be conditional on the implementation of the measures below:

- ✓ **the ICPE declaration (Installation Classified for the Protection of the Environment):** the company must declare the ICPE operated in the site base to the Regional Division of the Environment and Classified Establishments of the region concerned;
- ✓ **Authorisation by the Water and Forestry services:** all clearing operations for the clearing of plant species on all work sites must be authorised by the forestry service of the region concerned (basic installation on site, etc.).

### ***8.2.2.2. General measures to mitigate the negative impacts of the work***

#### ***8.2.2.2.1. Environmental Guidelines for Contractors***

The following recommendations will have to be incorporated into the contracts of the companies in charge of the works.



Measures	Proposed actions
General implementing measures	<ul style="list-style-type: none"> <li>- Make a well-considered and motivated choice of location: During the preparatory phase, in order to mitigate electrical and fire risks during the operation of solar PV power plants, particular attention should be paid to the choice of location for the photovoltaic fields and related installations. This choice should take into account the following recommendations:               <ul style="list-style-type: none"> <li>✓ location outside of flood zones or waterways. To this end, areas within 20 m of watercourses shall be avoided;</li> <li>✓ siting in areas of high natural and forest fire risk ;</li> <li>✓ located in an area easily accessible to public rescue services;</li> <li>✓ location away from residential areas (at least 50 m from the houses) .</li> </ul> </li> <li>- Carry out a communication and awareness campaign prior to the work.</li> <li>- Ensure compliance with health and safety measures for construction site facilities</li> <li>- Carry out signage of work</li> <li>- Give priority to employing local labour</li> <li>- Ensuring that safety regulations are observed during work</li> <li>- Ensuring the collection and disposal of waste from the works</li> <li>- Carry out awareness campaigns (hygiene, work safety, etc.).</li> <li>- Involve the Communes closely in monitoring implementation</li> <li>- Compensate affected persons for destruction of property or loss of activities</li> </ul>
Measures in the event of archaeological discoveries	<ul style="list-style-type: none"> <li>- During infrastructure works, all fossils, coins, valuables or antiquities, structures and other remains or objects of archaeological interest discovered on the site shall be deemed to be the absolute property of the country ;</li> <li>- In the event of the discovery of these archaeological objects, the Contractor shall take the following measures:               <ul style="list-style-type: none"> <li>✓ stop the work and delimit the area concerned ;</li> <li>✓ (b) To refer the matter to the Ministry of Culture for appropriate action;</li> </ul> </li> <li>- The Contractor in charge of the work shall take reasonable precautions to prevent its workers or any other person from removing or damaging these objects and shall notify "<b>ASER</b>" or its designated representative on the site of such discovery.</li> </ul>



<p>Good          environmental          and social          practices</p>	<ul style="list-style-type: none"> <li>- Planting new trees at the end of the work if vegetation is removed to compensate for possible felling ;</li> <li>- Avoid destroying animal habitats ;</li> <li>- Use the official landfill site authorized by the local authorities ;</li> <li>- Do not obstruct the passage to the residents;</li> <li>- To ensure compliance with health and safety measures for construction site installations;</li> <li>- Protect properties surrounding the work site ;</li> <li>- Avoid damage to existing vegetation ;</li> <li>- Avoid compacting the soil outside the building's right-of-way and making it impermeable and unfit for infiltration ;</li> <li>- Avoid harming the local population by using materials that make a lot of noise;</li> <li>- Do not burn rubbish on the construction site ;</li> <li>- Ensure the collection and disposal of waste generated by the work;</li> <li>- Recruit, as far as possible, people from the community to avoid conflicts between site staff and the local population ;</li> <li>- Where appropriate, carry out rational career management in accordance with the regulations in force;</li> <li>- Sensitize site personnel on STI/HIV/AIDS ;</li> <li>- Respect cultural sites ;</li> <li>- To take into account the nuisances (noise, dust, odours) and the safety of the population by organizing the construction site;</li> <li>- Avoid any discharge of waste water into foundation ditches, quarries, which can contaminate the water table and cause the development of disease-carrying insects;</li> <li>- Move away from building sites, as far as possible from houses, places of worship, schools, etc. ;</li> <li>- Sprinkling to reduce the spread of dust ;</li> <li>- Avoid any discharge of waste water, accidental or non-accidental spillage of used oil and spillage of pollutants on the ground, in surface or ground water, etc. ;</li> <li>- Install / develop structures to prevent obstruction of natural stormwater runoff paths so as not to expose the infrastructure to flooding ;</li> <li>- Place a cover over the debris destined for the landfill site ;</li> <li>- To take and ensure the application of safety measures for site personnel ;</li> <li>- Provide drinking water for site personnel.</li> <li>- Employ local labour as a priority.</li> </ul>
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8.2.2.2.2. *Safety measures to be observed on the various construction sites*

➔ *Integration of HSS measures in execution studies and specifications*

"ASER" should require in its specifications a number of safety measures to be taken to reduce the risks associated with the construction work. For this purpose, the delegated project owner could appoint a **Health, Safety and Environment (HSE) Expert**:

- during the realization of the execution studies and the works, for an optimal definition of the project in relation to health, safety and environmental issues and for the control and follow-up of the companies having to carry out the building sites;



- upon acceptance of the work, to validate its compliance with contractual and regulatory commitments and to carry out post-construction HSE monitoring and assessments.

The hygiene, health and safety of workers and residents of the sites concerned, as well as emergency response measures, must be an integral part of the Environmental and Social Management Plan (ESMP) for the project.

In addition, the delegated project owner will have to send an execution study file to the service in charge of prevention at the National Fire Brigade (BNSP) for advice before starting the works.

#### ➔ *Health and safety coordination*

A **Safety and Health Protection Coordinator (CSPS)** shall be appointed by ASER during the preparatory phase of the worksites. It will be responsible, through an analysis of the safety and health risks of worksites, for developing and implementing a **general safety and health protection coordination plan (GHSCP)** that companies and other subcontractors are required to take into account when carrying out the work. The clauses and provisions of this document should be considered as an integral part of the overall and lump-sum price of the various lots of the contract for the execution of the works.

This plan will place particular emphasis on :

- site facilities for staff (changing rooms, refectories, wash basins, WCs, showers, offices, meeting room, etc.) ;
- the medical follow-up of the staff;
- the traffic plan, signage and marking of the construction sites;
- electrical risks (locking and signalling) ;
- welding work ;
- works at height ;
- the use of lifting equipment ;
- cleaning and maintenance of workplaces ;
- risk analysis procedures ;
- the training program for reception and ongoing training for technicians, drivers and workers ;
- collective and individual protection ;
- emergency response measures.

Safety coordination meetings must be held regularly during the work. During these meetings, it should be examined whether the planned measures are being properly complied with and, if necessary, additional measures should be considered in accordance with the laws and regulations in force concerning hygiene, health and safety at construction sites.

#### ➔ *Collective and individual protection*

When adopting security measures, collective protections must be given priority. Any risks identified during the work must be eliminated or be the subject of appropriate preventive measures (signs and markings around an excavation, compliant scaffolding for work at height, etc.). Accident risk areas must be clearly marked (sign, safety cord, barrier) and access is prohibited if necessary.



The material used for the work must be in perfect condition. Equipment that has been deformed or weakened must be replaced immediately. Fire-fighting equipment (appropriate extinguishers) must be made available to the construction sites.

Undertakings must provide their staff with the equipment necessary for their protection and train them in its use, in particular :

- the helmet : the wearing of a helmet must be compulsory everywhere on the building site;
- Safety footwear is mandatory everywhere on the construction site and for all persons involved in the work and physical handling;
- compulsory gloves for hammer work, electrical connection work, etc. ;
- noise protection for work exposed to noise ;
- dust masks;
- fluorescent vests.

➔ ***Intervention on electrical installations***

- temporary electrical installations on site must comply with technical standards;
- the distribution boxes must be installed in sufficient number;
- the intervening parties must be trained in electrical risks and must have the necessary clearance (type B2) for each intervention on undervoltage equipment.

➔ ***Risk prevention measures for concrete mixers***

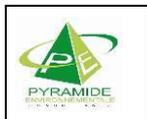
- regularly check the condition of the cables, latch and accessories, as well as the safety devices ;
- place the concrete mixer on a flat and horizontal surface ;
- protect the moving parts of the concrete mixers with casings ;
- immobilize the concrete mixers at the end of the work.

➔ ***Measures to prevent risks related to construction machinery***

- train personnel in the use of the equipment;
- use handling means adapted to the loads ;
- visually inspect the equipment before starting ;
- use equipment that complies with the regulations ;
- carry out preventive maintenance on the equipment (lifting accessories).

➔ ***Relief organization***

- the company must provide a permanent means of communication (mobile phone) to enable the call for help to be made from the workplace;
- the company will have to ensure the permanent presence of a first-aider at work trained and retrained for less than a year by an independent team. The first-aid rescuers must be easily identifiable (wearing a green or different coloured helmet) from other workers ;
- the company should have a first aid kit close to the workstations and post emergency telephone numbers;



- instructions on how to behave in the event of an accident should be posted near the means of communication and in the staff quarters and should be distributed as widely as possible to the staff.

#### 8.2.2.2.3. *Location rules and criteria for choosing sites in relation to third parties*

##### ➔ *For site bases*

###### Minimum distances from third parties :

- 40 meters from the road;
- 200 m from a water point (river, lake, pond, etc.) ;
- 200 m from an ERP (school, health centre, places of worship, commercial, etc.) if the site base does not include the production base;
- 200 m from the houses if the construction site base does not include the production base;
- 500 m from the houses and ERPs if the site base integrates the production base.

##### ➔ *For the life bases to be built (if necessary)*

###### Minimum distances from third parties :

- 40 meters from the road;
- 50 m from a water point (river, lake, pond, etc.) ;
- 50 m from an ERP (school, hospitals, etc.) ;
- 50 m from the houses.

**NB:** For rented databases: Make sure of the rules for implementing an ERP with the preparation of a security notice (or plan) validated by the BNSP.

Sites should be selected to limit brush clearing and tree cutting. Useful or large trees (diameter over 20 cm) should be preserved and protected. Sites will have to be chosen outside flood-prone areas.

#### 8.2.2.2.4. *Requirements for the concrete batching plant*

##### ➔ *Layout rules and easement distances*

1. the easement distance is 50 m. Without mixer and/or with a mixer with a capacity of less than 3 m<sup>3</sup>, the distance can be reduced to 20 m ;
2. The location of the concrete batching plant must be justified by the morphology of the terrain and the direction of the prevailing winds ;
3. the flow slopes in case of water spills must be towards the roe collection basin. This slope should prevent the pond from being filled by water runoff during rainfall.



➔ ***Means of Prevention and control of pollution and nuisances***

1. the equipment constituting the plant (hoppers, mixers, pumps, loaders, etc.) must be chosen to be below 80 dbA ;
2. the stocks of admixtures in drums and/or bags are stored on a waterproof slab with retentions ;
3. Aggregates and/or materials must be enclosed and where covered to avoid flying away;
4. the rinsing area for the rotors must be paved and sealed ;
5. the conveyors must be covered;
6. the loading hoppers must be covered to minimise the risk of flying;
7. Dust emission points, such as silo vents, mixer inlet and outlet pipes, truck loading pipes, are equipped with dust mimicking devices and/or a dust removal device ;
8. a device for wetting and spraying aggregate/material stocks and runways/roads must be set up if necessary ;
9. the posting of safety, prohibition and hygiene instructions/pictograms to be respected in these places.

➔ ***Means of Fire Prevention and Firefighting***

- 02 P50 ABC fire extinguishers at the plant and 9 kg ABC fire extinguishers judiciously distributed
- If a diesel tank is present, refer to the measures below.

8.2.2.2.5. *Fuel storage*

Means of preventing and combating pollution and nuisances

1. the retention must be made of BA (reinforced concrete with a thickness of at least 20 cm) and watertight. If this is not possible, double-walled vessels should be used;
2. the retention capacity must be at least the volume of the tank (for 01 tanks) or 50% of the total volume of the tanks;
3. the retention must have an outlet with a sealed 02-way valve (normally closed) for the evacuation of rainwater either to the pit equipped with a hydrocarbon separator or to the natural environment;
4. a 1 m<sup>3</sup> pit equipped with a hydrocarbon separator must be installed at the outlet of the rainwater drainage valve ;
5. the gear supply platform must have a watertight slab and a drip recovery system ;
6. Anti-impact devices (studs) to prevent machinery and lorries from colliding with each other;
7. the tanks must have test certificates ;
8. the provision of spill clean-up kits with absorbents ;
9. all pollution must be documented and reported to the environmental authorities (Obligation to inform in case of soil pollution).

Means of Fire Prevention and Fighting

1. put up the safety and prohibition signs and instructions to be respected in these places;
2. display on the tanks the type of fuel stored and its capacity ;



3. install ATEX electrical equipment on site ;
4. earth the metal masses with a disconnecting strip via an equipotential bonding ;
5. install 02 ABC fire extinguishers (and/or fitted with foamers) of 50 kg at least judiciously distributed around the retention basin and 02 ABC fire extinguishers of 9 kg + 01 sandbox fitted with shovel at each pump of the distribution station;
6. equip the unloading platform with an earthing clamp ;
7. ensure that the anchoring of the tanks is such as to ensure the stability and physical integrity of the installations;
8. to equip the tanks with a standard platform (stairs, railings, etc.) for manoeuvring at height;
9. to equip the tanks with a gauging device allowing the quantity of liquid remaining in each of them to be measured.

### **Operating conditions**

All above-ground and underground tanks must be authorised by the DREEC.

#### *8.2.2.2.6. General measures for the prevention and control of pollution and nuisances*

1. to set up a storage area for new oil drums, equipped with a platform with watertight retention ;
2. arrange a storage area for pressurised cylinders (acetylene, oxygen, etc.) outside access roads, passageways and keep a distance of 15 m from any source of ignition or storage of oxidant ;
3. Prohibit open burning of waste and install waste bins in the work area with separation of common and hazardous waste;
4. provide a recovery area for used oil with a recovery tank, a watertight slab and a retention ;
5. provide absorbent kits, absorbent mats, retention bins to prevent accidental leaks and spills in the workshop ;
6. use manual or electric pumps for any transfer of polluting products such as diesel and oil;
7. store polluting products such as fuels, lubricants, form release oils, solvents, special additives, etc. on retention bins;
8. provide a washing area for machines and construction equipment equipped with belt walls on three sides (the access side is not concerned); channel the platform to collect the washing water and level a slope to prevent the washing water from being dumped on the ground via the access road; set up a treatment basin for the washing water collected (oil separator); channel the platform to collect the washing water and level a slope to prevent the washing water from being dumped on the ground via the access road ;
9. set up a treatment basin for the collected washing water (oil separator).
10. prohibit the use of lime kettles to produce artisanal acetylene for welding purposes. Use industrial acetylene cylinders.

#### *8.2.2.2.7. Borrowing management measures (if applicable)*

The following basic measures are required for the management of borrowings:

- to secure the site by restricting access to the population and to set up a permanent system of guards;

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- develop the rehabilitation plan for the site which will take into account the recommendations of the population concerning the future use of the site;
- forward the rehabilitation plan to CED.

### 8.2.3. General environmental management measures in the operation phase

#### Regulatory Measures

##### 8.2.3.1. Administrative compliance obligations

Themes	References	Content	Relevance
<b>Prior approvals</b>			
Operation of a Classified Facility	Environmental Code - Article L10	Installations referred to in Article L 9 shall be divided into two classes. Depending on the danger or the seriousness of the inconveniences that may arise from their use, they are either subject to authorisation or to declaration.	"ASER" will install ICPE (power station generators) which, depending on their size, will have to be authorized or declared prior to commissioning.
<b>Environmental taxes</b>			
ICPE Tax	Environment Code - Article L27	Annual fees and taxes relating to BPIs are collected by the Ministry of the Environment. They are made up of area taxes, taxes on equipment, etc.	These fees are due for the authorisation of classified installations and for their annual operation.
<b>OHS Statements</b>			
OHS Policy	Labour Code, Decree No. 2006-1256 of 15 November 2006 on the employer's obligations in terms of health and safety at work and Decree No. 94-244 of 7 March 1994.	Transmission of the report on the general health and safety situation of the establishment to the labour inspector	The operation of mini-solar power plants presents OSH risks.
<b>Security - Fire</b>			

Themes	References	Content	Relevance
Security - Fire	Interministerial Order making the installation of lightning conductors compulsory on establishments and installations at risk.	Installing a lightning conductor	The mini power stations must be equipped with lightning conductors before being put into service.
Security - Fire	Article 48 of decree 2006-1261 on general health and safety measures	The employer must take the necessary first aid and fire-fighting measures appropriate to the nature of the activities, including	Due to the fire risks associated with the mini power plant installations and the absence of fire stations in some areas of the intervention zone, fire extinguishing means must be provided on site to fight any fire outbreak.

### Technical measures

Impacts	Management Measures
Impacts on populations (development of pests)	Establish a periodic maintenance program to avoid the development of wildlife at risk (under signs) for workers and populations (snakes, scorpions, etc.).
Impact on water resources (change in runoff conditions)	Because of the small areas mobilized for the installation of the facilities, the project will have a nil to negligible impact on the modification of water runoff conditions. <u>In addition, no installation will be located on slopes or areas that may cause flow disturbance (site acceptance criteria).</u>
Impacts on water resources (pollution risks)	In order to avoid pollution of the soil and possibly the subsoil and groundwater, the project will use cleaners based on essential oils and natural surfactants, also alcohol-free, for the maintenance of the panels.  For black water, watertight pits will have to be provided on site.
Waste Impacts	Put in place a waste management plan with : <ul style="list-style-type: none"> <li>- the orientation of common waste to authorized landfills ;</li> <li>- the channelling of hazardous waste (used oils, used batteries and accumulators, etc. to authorised channels).</li> </ul>
Fire hazards	<ul style="list-style-type: none"> <li>- Install continuous monitoring of the plant with an alert system in case of an incident. In addition, set up a remote control system for the technical room ;</li> <li>- Implementing efficient fire extinguishing means ;</li> <li>- Equip the technical rooms with suitable extinguishers ;</li> <li>- Weeding a 10 m wide corridor around the mini power plant to avoid fires (firewall) ;</li> </ul>



Impacts	Management Measures
	<ul style="list-style-type: none"> <li>- Have a well dimensioned lightning arrester available;</li> <li>- Have a fire safety plan in place before commissioning the mini power plant.</li> </ul> <p><u>Technical Provisions</u></p> <ul style="list-style-type: none"> <li>- the installation of the installations (inverters, cables, etc.) will comply with NFC 15100 and UTE C15-71261. Its compliance shall be subject to periodic verification by recognised organisations ;</li> <li>- the installation of electrical equipment (connection box, cables, inverters, etc.) must comply with the standards in force. Cables must be of category C2 and the installations must have only fixed conduits ;</li> <li>- the cables between the Panels and the UPS will be laid in technical ducts protected in a fire situation:             <ul style="list-style-type: none"> <li>✓ these chimneys must provide a fire stop rating identical to the fire stability rating of the building, or else with a minimum of 30 minutes (I30).</li> <li>✓ these paths must not pass through areas of particular risk.</li> </ul> </li> <li>- the cable and cable tray crossings must be protected (caulked) to ensure at least the same fire resistance time as the wall being crossed;</li> <li>- the inverters shall be installed in a volume as close as possible to the photovoltaic modules, which must not be accessible to the public or unauthorised occupying personnel. The safety of this volume will be carried out in accordance with the safety regulations for electrical service rooms of the type of building concerned;</li> <li>- the use of pluggable or rotary locking connectors is preferred;</li> <li>- the implementation of systems that allow the operation of safety installations in the event of a fire :             <ul style="list-style-type: none"> <li>✓ a thermo-fuse type cut-off system which trips at a temperature of around 250°C;</li> <li>✓ system of an emergency switch positioned near the PVs and which can be operated remotely.</li> </ul> </li> <li>- the personnel working in the installations must be trained in electrical risks and have a qualification adapted to the types of work carried out.</li> </ul> <p>The main existing preventive or protective measures are compliance with the electrical standards, which are listed below:</p> <ul style="list-style-type: none"> <li>- fire detection at the inverter and the presence of extinguishing means in the vicinity if the configuration allows it;</li> <li>- the presence of a cut-off device (short-circuit or thermal switch) ;</li> <li>- the obligation to have a work permit for each hot spot for companies working on or near such equipment ;</li> </ul>

Impacts	Management Measures
Risks related to maintenance operations	<ul style="list-style-type: none"> <li>- the installation of lightning protection.</li> <li>- Disconnect power and ground live power lines before undertaking work on or near these lines;</li> <li>- Ensure that work on live wires is carried out by trained workers and in strict compliance with safety and insulation standards ;</li> <li>- Provide operators with the necessary personal protective equipment before any work in electrical works, namely: insulating helmet, anti-UV safety glasses, insulating gloves, work clothing made of fireproof material, insulating safety shoes.</li> </ul>

**8.2.3.2. Measures to be taken into account when ordering equipment (Design Consideration)**

The provisions and measures to be taken into account in the design (equipment design) are recalled here:

Themes	References	Measures to be taken into account when ordering equipment
Pollution management	<b>Annex IV of NS 05-062:</b> The height of chimneys may not be less than 10 m.	All installations/equipment with a channelled discharge of air pollutants (generators, etc.) must be equipped with a chimney of at least 10 m in length.
Nuisance Management / Occupational Health	<b>Articles 13 and 14 of Decree No. 2006-1252 of 15 November 2006 on ambient physical factors:</b> the daily noise exposure level received by a worker throughout the working day must not exceed eighty-five (85) A-weighted decibels (dB -A-).	All equipment controls shall take into account the noise level not to exceed 85 A-weighted decibels (dB -A-).
Worker Protection / Occupational Health	<b>Article 39 of Decree 2006-1251 of 15 November 2006 on work equipment:</b> Where necessary and in all cases where it is technically impossible to totally eliminate the nuisance caused by work equipment, the employer must provide workers with suitable personal protective equipment.	All equipment orders must take into account the provision of PPE suitable for the equipment.

Themes	References	Measures to be taken into account when ordering equipment
Security / Fire	<b>Article 48 of decree 2006-1261</b> on general health and safety measures	"ASER" must take the necessary first aid and fire-fighting measures, adapted to the nature of the activities on each site/installation.
Security / Fire	Levelling of risk areas of the safety signs/guidelines	All sites must be marked out (display of safety instructions to be respected according to the level of risk on site) before being put into service.

In general, the following measures should be taken into account when ordering and selecting equipment, depending on the project components:

➔ ***Electrical installations of the plant***

In order to prevent any electrical risk associated with photovoltaic plants and related installations, the design and operation of the works shall provide for the following measures:

- the panels and electrical components shall be equipped with DC and AC surge arresters and protection devices in accordance with the international standard IEC 61024, which is the international reference in this field;
- the installation will be equipped with a lightning conductor whatever the level of lightning strikes in the area where the solar power plant is installed;
- the equipotentiality of all the conductive elements and metallic masses (except for the battery bank) by means of earth connections;
- LV electrical structures will be installed and operated in accordance with NFC 15-100 ;
- training and certification (type B2 and BP) of the operators who must install and operate the electrical equipment of the photovoltaic system;
- a maintenance and preventive maintenance plan with visual inspections, electrical measurements, technical room checks, and replacement of defective elements;
- for the technical room :
  - it will be secure, insulated, air-conditioned and waterproof;
  - it will have fire walls of degree 2h;
  - The installation of the DC and AC protection boxes and the inverter must be installed at a height of more than 120 cm above the floor to make them inaccessible to children;
  - the presence of a self-contained emergency lighting unit including the mains power supply ;
  - the presence of an insulating stool and device for checking the absence of voltage and a rescue pole ;
  - Safety signs and markings (safety instructions, dangers of the system and emergency telephone numbers) ;
  - a set of personal protective equipment (PPE) in the form of electro-safety cases will be placed at the entrance to the technical room to allow intervention on the electrical structures in the event of an incident. Minimum PPE are to be provided such as: insulating helmet, anti-UV safety glasses, insulating gloves, insulating safety shoes;



- the maintenance and periodic cleaning of the premises and the prohibition of eating and/or drinking in or near the premises will help to control rodents ;
- Suitable and sufficient extinguishing means shall be provided for extinguishing fires of electrical origin (2 kg and 6 kg CO<sub>2</sub> extinguishers).

#### → *Electricity storage batteries*

The following measures are required to mitigate the risks associated with the operation of the batteries:

- the batteries will be completely closed and delivered without external acid;
- a retention shall be built in at each battery bank with a capacity equal to 100% of the total volume of electrolyte contained in all cells of the bank ;
- the shielding of the battery terminals and non-insulated conductors ;
- training of personnel in health and safety and public awareness of risk management;
- the provision of an eye washer kit for rinsing in case of accidental contact with sulphuric acid ;
- Used batteries will not be stored in residential areas.

#### → *Generating sets*

In order to mitigate the risks associated with the operation of generating sets, it is necessary to :

- choose soundproof groups ;
- train operating personnel in health and safety and risk management ;
- raise awareness of the surrounding populations on the functioning of the groups and the associated risks ;
- provide the appropriate PPE and require it to be worn for maintenance of the units;
- avoid as far as possible the storage of lubricants and waste oils on site ;
- have a PS-50 type fire extinguisher and sandbox near each unit.

#### → *Preventing the risks of malevolence and theft*

Malicious acts and vandalism can be prevented by the following measures:

- The entire photovoltaic plant will be fenced off and a remote monitoring and surveillance system is planned;
- the technical room will remain locked and not accessible to the public for security reasons. Only dealers and ASER representatives will be allowed to enter ;
- raising the awareness of the surrounding populations.

#### → *Fire safety*

The measures to prevent and fight against a fire outbreak are, among others, the following:

- choice of electrical equipment meeting strict technical standards and flame-retardant cables;
- no smoking in the technical room and its surroundings ;
- training in the use of fire-fighting equipment ;

- regular maintenance of the site by clearing a 50 m radius of brush, which will prevent the development of tall grass that could encourage the spread of a fire;
- a 5 m wide firebreak strip will be maintained around the site ;
- accesses and paths will be kept accessible at all times and in good traffic condition for the emergency services.

#### 8.2.4. End of equipment life

Impacts	Mitigation measures
Risk of pollution	Formalize the management of end-of-life or used facilities with the implementation of a dismantling and rehabilitation plan.

### 8.3. Implementation of environmental and social management

#### 8.3.1. Strategy for environmental and social project preparation and management

For the implementation of the environmental and social management measures, it is necessary to clarify the methodological approach for integrating environmental and social management measures (see point 7.2) during the planning and implementation phase of the Project activities. Thus, the environmental and social screening process (or "screening") proposed below aims to ensure that environmental and social requirements are effectively taken into account throughout the process of planning, preparation, implementation and monitoring of projects to be carried out by ASER.

The process includes the following steps:

Phase	Technical Activity and Responsible	Tools / Deliverables
<b>Step 1:</b> Formulation of environmental and social cross-compliance criteria for each project	In this stage, the environmental and social selection form for projects in <u>Annex 2</u> will be filled in, the site of the mini power plants will be validated and their environmental and social classification will be carried out. The filling in of the initial selection form will be carried out by the DREEC, on the basis of the DEEC- ASER convention, with the support of the relevant technical services: forestry service, ARD, etc.	Screening form (see Annex 2)
<b>Step 2:</b> Validation of the environmental and social classification of the project	The validation of the environmental and social classification will have to be carried out by the CED.  <b>NB:</b> Given the context of the project, marked by the construction of 1,000 solar power plants in an emergency context, the environmental and social diagnosis or preliminary screening will have to replace the environmental and	Consolidated and validated screening form (see Annex 2)

	<p>social assessment procedure. Indeed, a procedure requiring 1,000 environmental assessments could jeopardize the feasibility of the project.</p> <p><b>This specificity of the project will have to be taken into account in the framework of the DEEC - ASER agreement.</b></p>	
<p><b>Step 3:</b> Execution of the environmental and social work of the project / Integration of environmental measures in the tender documents / DRP and DE</p>	<p>As part of the work, the contractual documents of the contract will require the company <u>to produce a worksite GEP based on the measures defined in Point 7.2.2 General environmental management measures during the work phase</u>. This site GHGMP, which should allow the operationalization of GHG measures, must be examined and validated by CED.</p> <p>"ASER, with the support of CED and CEDRD, will ensure that recommendations and other environmental and social management requirements are incorporated into the tender and project implementation files. DAOs can only be launched when all environmental and social due diligence is effectively taken into account and integrated into the tender.</p> <p>Particular attention will have to be paid to the cost elements related to environmental and social measures that need to be integrated in the detailed estimates and price schedule.</p> <p>Social aspects will be particularly monitored in the integration of measures in the DAO and DRP, with particular attention to the following points:</p> <ul style="list-style-type: none"> <li>- the participation of the most vulnerable groups ;</li> <li>- gender mainstreaming;</li> <li>- social support measures ;</li> <li>- and the like</li> </ul>	<p>Environmental and social clauses finalized</p>

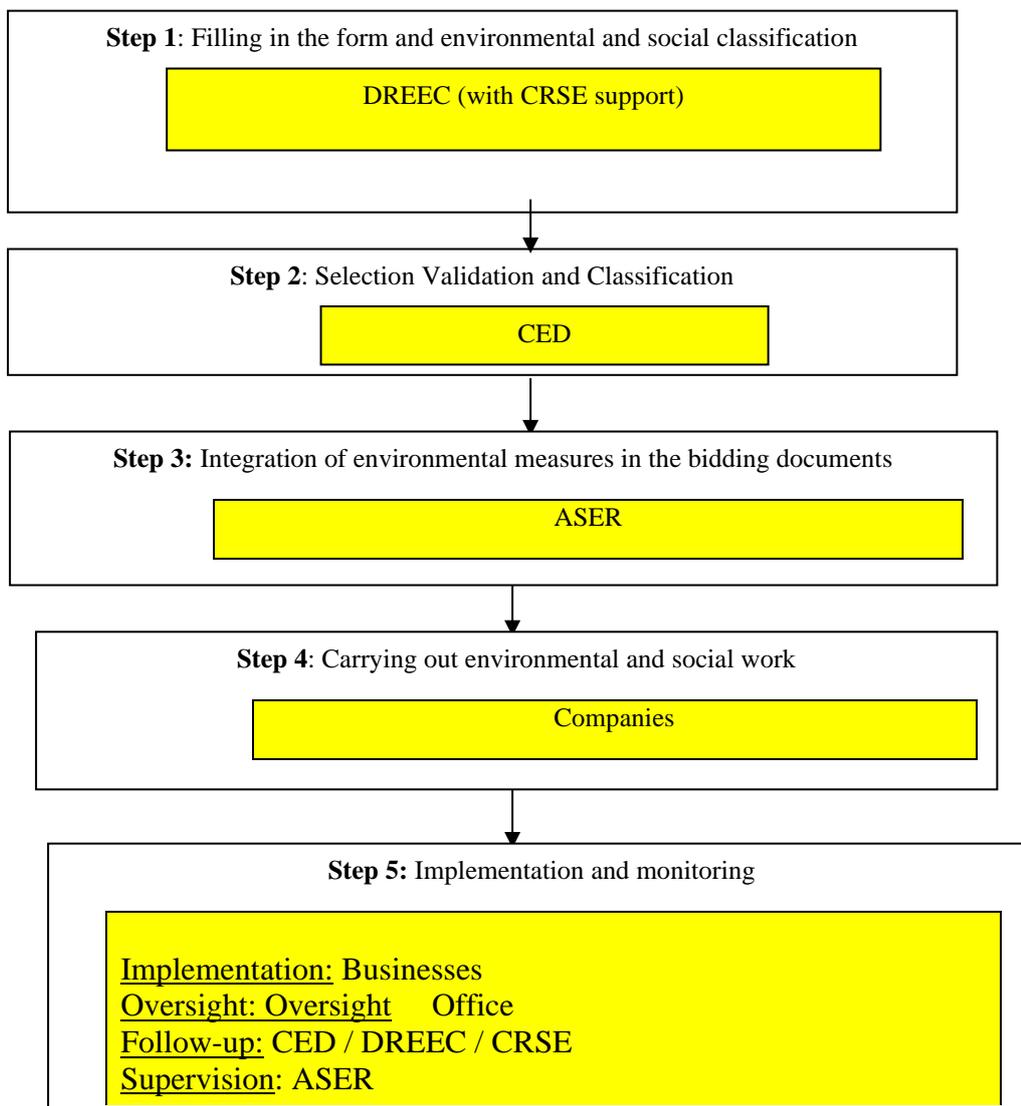


	<p>As a general rule, contracting undertakings must undertake to :</p> <ul style="list-style-type: none"> <li>- implementing environmental and social measures ;</li> <li>- comply with the directives and other environmental requirements contained in works contracts as contractual components.</li> </ul> <p>With regard to equipment, "ASER" will have to ensure the integration of design measures (<i>see point 7.2.3.2. Measures to be taken into account in the CADs of the equipment components.</i></p>	
<p><b>Step 4:</b>  <u>Implementation</u> and monitoring of environmental and social measures <u>in the works phase</u></p>	<p>For each project, private providers and companies are responsible for the implementation of environmental and social measures. However, beforehand, they will have to prepare and implement a site Environmental and Social Management Plan (ESMP).</p> <p>The implementation will be monitored as follows:</p> <ul style="list-style-type: none"> <li>• the supervision of the activities will be ensured by "ASER".</li> <li>• close monitoring of the implementation of environmental and social measures will have to be carried out by the control offices to be appointed. To this end, the presence of an HSE manager in the audit team will be required.</li> <li>• the follow-up will be carried out by the DEEC and the DREECs through the DEEC - ASER convention.</li> </ul>	<ul style="list-style-type: none"> <li>- Environmental and Social Management Plan (ESMP) for the construction site</li> <li>- Follow-up report / monitoring</li> </ul>
<p><b>Step 5:</b>  <u>Implementation of</u> environmental and social measures <u>in the operation phase</u></p>	<p>In the operations phase, the implementation of GHG measures will be the responsibility of the structures in charge of operations. To this end, the retrocession clauses of the measures will have to integrate the obligation to implement GHG measures.</p>	<ul style="list-style-type: none"> <li>- Retrocession clauses integrating environmental and social measures</li> <li>- Follow-up report / monitoring</li> </ul>

The operationalisation of this framework is based on the device shown in the following table.

<b>Step</b>	<b>Activities</b>	<b>Execution</b>	<b>Supervision</b>
1	Formulation of environmental and social conditionality criteria for each project (Filling in the Environmental and Social Selection of Projects form in Annex 2)	<ul style="list-style-type: none"> <li>- DREEC</li> <li>- Forest Service,</li> <li>- ARD</li> <li>- Etc.</li> </ul>	<ul style="list-style-type: none"> <li>- CED</li> <li>- ASER</li> </ul>
2	Validation of environmental and social cross compliance criteria	CED	ASER
3	Integration of environmental and social provisions in the tender and work execution documents	- ASER	CED
4	Execution of environmental work (Site ESMP)	Companies	<ul style="list-style-type: none"> <li>- CED</li> <li>- ASER</li> </ul>
5	Implementation and Monitoring	<ul style="list-style-type: none"> <li>- Companies</li> <li>- Control Office</li> </ul>	<ul style="list-style-type: none"> <li>- CED</li> <li>- ASER</li> <li>- CRSE</li> <li>- DREEC</li> </ul>

**Figure 8:** Flowchart of the environmental selection of "ASER" projects



## 8.3.2. Recommendations for implementation

### 8.3.2.1. Implementation of procedures

#### 8.3.1.1. Internal communication procedure

Effective environmental and social management will be based on a clear organisation of communication between stakeholders. Indeed, a clear workflow for handling environmental events is essential to ensure a rapid and effective implementation of the necessary actions (especially in emergency situations).

This procedure has the advantage of allowing :

- to define the mechanisms for stopping the work if the situation is deemed to be of concern;
- a feedback through which "ASER" ensures that the correction is made;



- initiate an incident investigation to determine the causes of the incident and to assess whether changes in specifications, requirements or methods are warranted to prevent recurrence.

For this purpose, it is important to "ASER" :

- define the penalties applicable in the event of non-compliance found during the performance of the services from an environmental and social point of view ;
- to designate resource persons and establish an organizational plan to provide prompt responses to critical situations raised on the site;
- to set a timing for the processing of files at each level of the chain of intervention, to ensure a certain efficiency in the responses to be provided.

### ***8.3.1.2.External consultation procedure (Consultation Plan)***

#### *8.3.1.2.1. Background and Purpose of the Consultation Plan*

The Public Consultation Plan aims to ensure the social acceptability of projects at the community level by putting all stakeholders in a network to share information on the project and its interventions. The plan aims to bring the actors to have a common vision and shared objectives of the activities to be undertaken by the project:

- in its planning phase (identification and preparation phase) ;
- in its implementation phase (technical execution of activities) ;
- in its commissioning phase (infrastructure operation).

The consultation process refers to the need to involve the different parties in identifying needs, monitoring activities and evaluating them from a perspective of citizen control, knowledge sharing and social effectiveness.

#### *8.3.1.2.2. Consultation mechanisms and procedures*

The mechanisms and procedures for information, consultation and negotiation to be put in place should be based on the following points:

- knowledge of the project's areas of intervention ;
- the social acceptability of the project.

Consultation tools and techniques will have to conform to a logic of communication and awareness.

#### *8.3.1.2.3. Strategy*

The start of strategic planning and the provision of information on the project should be marked by forums in the form of DRBs organized in the regions.

The objectives are :

- the coherence of the project's interventions;
- the setting up of a consultation framework allowing early consideration of the difficulties noted in the implementation of the project;

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- the follow-up of interventions.

In this context, it is important to set up a local information and monitoring committee (CLIS) in each community concerned. The role of this committee will be:

- to support "**ASER**" in the social appropriation of the project;
- to mobilize the various actors present in the Community for a peaceful implementation of the project;
- provide a framework for the amicable resolution of potential conflicts (land or other).

A local NGO or association specialized in social mobilization could help facilitate the establishment and operations of these sectoral or socio-professional groups, but above all ensure quality and equity in representation (marginalized groups, gender, etc.).

#### 8.3.1.2.4. *Steps of the consultation*

The Consultation Plan can take place through three (03) axes :

- local consultation or the organisation of forums ;
- the organization of open days on the project and its achievements;
- sectoral meetings of social and/or interest groups.

#### 8.3.1.2.5. *Consultation process*

The public consultation process should be structured along the following lines:

##### ✓ *In the preparation / formulation of projects*

- Preparation of project execution files including project screening ;
- Definition and validation of GHG measures.

##### ✓ *In the work phase*

- Communication on activities and agendas ;
- Raising awareness on the scope of the interventions and the areas concerned.

#### 8.3.1.2.6. *Procedure for receiving, handling and following up complaints and grievances*

Complaint management is an essential part of the "societal engineering" component. Indeed, if bold support measures are not implemented to benefit these targets, the negative impacts of the worksite could be heavy on local residents, particularly the underprivileged social classes, and lead to situations of marginalization and exclusion.

A specific directory will therefore be dedicated to comments and complaints. To carry out this work of facilitation and social support for the populations, sharing and information workshops bringing together the various stakeholders will be set up. These participatory management spaces will enable the impacted populations to express their grievances about possible nuisances (air and noise pollution due to worksite work, insecurity due to speeding, etc.).

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Complaints/complaints booklets will be designed and made available at the local level (village chief or town hall) of the polarized zones. Depending on their nature, these complaints will be collected regularly and processed without delay with the utmost diligence by the Company.

A register will be made available to local and customary populations, notables and authorities to enable them to register their complaints and grievances with the Company in charge of the works.

The purpose of the register is to establish a permanent channel of communication between the populations and the Company.

Any complaint or grievance recorded in this register will be processed by the Company and the outcome brought to the attention of the complainant and, if necessary, of any other person who may be concerned by it. Hence the need to always clearly indicate the contact details of the initiators of the complaints and/or grievances.

#### **8.3.2.2. Prerequisites for starting work**

Prior to the implementation of projects, the following measures are recommended :

- **carrying out detailed technical studies of the infrastructures and their related components ;**
- **Information and awareness of all stakeholders:** before the start of work, information sessions will be organized with the people in charge of the riparian populations, to provide information on the project and on the planned environmental measures. These sessions will also clarify roles and responsibilities to ensure participation in implementation;
- **preparation of a classified establishment file:** as some site installations are categorized as ICPE, companies will have to prepare and submit a classified establishment file, at the DEEC level;
- **Deepening of the initial state and preparation of the site ESMP:** some information remains undetermined at the time of the screening (site of the site base, etc.). In this context, even though procedures have been defined for the selection of sites for the construction site base, etc., it is important to note that these procedures have not yet been implemented. (*Cf. 7.2.2.2 General mitigation measures during the construction phase*), the impacts related to these components could not be precisely apprehended. For this purpose, the Company will be asked to produce, at the same time as its execution project, a precise and detailed Environmental and Social Management Plan (ESMP) for the construction site, whose procedures and contents must comply with the major orientations defined by the Senegalese regulations on the management of pollution, nuisances and the conduct of construction sites. Once approved by "ASER" and CED, the site GHGMP will be contractual in nature for all parties and will serve as a frame of reference for site monitoring.

#### **8.3.2.3. Responsibilities and obligations**

The Company in charge of the work will be obliged to comply with the clauses of the Contract Contract and the GHG measures that will be sent to it in the form of **Specific Technical Specifications**.

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The respect of these documents will condition in particular the final acceptance of the building site and the payment of the related financial deadline. The environmental type-approval shall be carried out on the basis of the form in **Annex 1**.

### **8.3.3. Assessment of environmental and social management capacities**

The environmental and social management of the project should involve the following institutional actors:

- "ASER" which ensures the coordination of the project;
- DEEC (partner in the application of environmental and social procedures through the proposed partnership agreement) ;
- the CRSE (Entity for monitoring project interventions).

**Table 14:** Assessment of stakeholders' capacities and proposed strengthening measures

Target	Current capacity	Strengthening proposal		Cost CFA
		Institutional measures	Technical Measures	
<b>ASER</b>	Lack of environmental and social expertise	Signing of an agreement between DEEC and ASER	Requirement for an HSE expert within the companies in charge of the work and control missions	- 150,000,000 for the agreement with DEEC - PM for HSE experts from companies and control missions
<b>CED</b>	The Direction de l'environnement et des établissements classés (DEEC) monitors the ESIA's. At the regional level, the DEEC relies on the Regional Divisions of the Environment and Classified Establishments (DREEC) and the Regional Committees for environmental and social monitoring of local development projects set up by order of the Regional Governors. The DEEC and DREECs have definite capacities in environmental and social assessment, but they are faced with logistical constraints in carrying out their mission (insufficient human and technical resources).	Given the context of the project, marked by the realization of 1,000 mini-solar power plants in an emergency context, the environmental and social diagnosis or preliminary sorting will have to replace the national procedure for environmental and social assessment. Indeed, a procedure requiring 1,000 environmental assessments could jeopardize the feasibility of the project. This specificity of the project will have to be taken into account in the framework of the DEEC - ASER agreement. Thus, the Ministry of the Environment and Sustainable Development (through the DEEC) will have to supervise the consideration of environmental and social aspects in the preparation and implementation of project activities.	Support for mobility and taking charge of monitoring / supervision missions	PM (taken over in the agreement with the DEEC (Cf. Point above))
<b>CRSE</b>	- Insufficient environmental and social expertise		Awareness raising, monitoring and	25.000.000

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Target	Current capacity	Strengthening proposal		Cost CFA
		Institutional measures	Technical Measures	
	- Low operational capacity	-	evaluation of environmental impacts (training seminars)	

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### **8.3.4. Training and awareness-raising of the actors involved in the implementation of the project**

The interventions of **the ASER** project involve several categories of institutional actors, whose capacities are either non-existent or very insufficient. Therefore, in order to ensure the sustainability of the project interventions, it is suggested to strengthen the capacities of these actors.

At the technical level, ASER will have to integrate a capacity building component with the training of service providers (SMEs that may be involved in the maintenance of the plants). The objective is to qualify these companies to the understanding, handling of solar and electrical solutions.

On the environmental front, workshops will be organised to enable the target stakeholders to become familiar with environmental selection procedures.

The themes should revolve around :

- ✓ environmental and social issues of mini-solar power plants ;
- ✓ of safety related to mini-solar power plants.

The training should also make it possible to familiarize the actors with :

- ✓ national environmental regulations ;
- ✓ environmental control and monitoring.

The following table gives recommendations for the training of the main actors involved and the implementation of the project.

**Table 15:** Training modules / Information needs

Objectives of the training	Operationalization	Targets	Persons responsible for implementation	Costs (F CFA)
<b>Trainings</b>				
<p><b><u>Module 1:</u></b> <i>Environmental and Social Assessment</i></p> <p>Procedure definition of environmental and social management measures and impact indicators.</p>	<b>Training Workshop</b>	<ul style="list-style-type: none"> <li>- CRSE</li> <li>- Local elected officials</li> </ul>	<ul style="list-style-type: none"> <li>- ASER</li> <li>- DEEC / DREEC (CF. Convention DEEC-ASER)</li> </ul>	50.000.000
<p><b><u>Module 2:</u></b> <i>Training on Environmental and Social Monitoring</i></p> <ul style="list-style-type: none"> <li>• Knowledge of the environmental monitoring process ;</li> <li>• Environmental and social monitoring methodology ;</li> <li>• Environmental and social monitoring indicators.</li> </ul>	<b>Training Workshop</b>	<ul style="list-style-type: none"> <li>- CRSE</li> <li>- Companies</li> </ul>	<ul style="list-style-type: none"> <li>- ASER</li> <li>- CED</li> <li>- DREEC</li> </ul>	PM (taken into account in the DEEC- ASER convention)
<p><b><u>Module 3:</u></b> <i>HSE training</i></p> <ul style="list-style-type: none"> <li>• Training &amp; awareness of security risks related to certain tasks ;</li> <li>• Fire Fighting Procedures and Emergency Response ;</li> <li>• Training on the risks associated with construction sites and safety procedures to be followed (meaning of sound signals and rules to be followed in the event of a sound signal, etc.).</li> </ul>	<b>Quarter-hour HSE</b>	<ul style="list-style-type: none"> <li>- Workers</li> </ul>	<ul style="list-style-type: none"> <li>- Companies</li> <li>- Subcontractors</li> <li>- Control missions</li> </ul>	PM (Taken into account in company contracts)
<p><b><u>Module 4:</u></b> <i>HSE training</i></p> <ul style="list-style-type: none"> <li>• Training &amp; awareness on safety risks related to solar power plants ;</li> <li>• Firefighting procedures and emergency response in solar power plants.</li> </ul>	<b>Training Workshop</b>	Operators	<ul style="list-style-type: none"> <li>- ASER</li> </ul>	40.000.000
<b>Information</b>				

	<p align="center"><b>RURAL ELECTRIFICATION PROJECT IN SEVEN (07) ADMINISTRATIVE REGIONS IN SENEGAL (Kaffrine, Kaolack, Fatick, Kolda, Kédougou, Tambacounda et Saint-Louis)</b></p> <p align="center"><b>Environmental and Social Impact Assessment Report</b> <i>(Preliminary Report)</i></p>	<p align="center"><b>Provisional version</b> <i>22/03/2020</i></p>
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<ul style="list-style-type: none"> <li>• Information on the start and duration of the work</li> <li>• Information on safety procedures and impacts related to the work</li> </ul>	<p align="center"><b>Local Forums</b></p>	<ul style="list-style-type: none"> <li>- Administrative authorities</li> <li>- Populations</li> </ul>	<ul style="list-style-type: none"> <li>- ASER</li> <li>- CED</li> <li>- DREEC</li> <li>- Companies</li> </ul>	<p>PM (Taken into account in company contracts)</p>
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## **CHAPTER 9: MONITORING AND FOLLOW-UP FRAMEWORK PLAN**

The implementation of this environmental strategy requires the setting up of an environmental monitoring and surveillance system for the various project interventions.

### **9.1. Environmental monitoring**

Environmental monitoring will make it possible to verify, in the field, the accuracy of the assessment of certain impacts and the effectiveness of certain planned mitigation or compensation measures, for which certain uncertainties remain. The knowledge gained through the environmental follow-up will allow the proposed mitigation measures to be corrected.

The follow-up describes :

- ✓ the elements to be monitored ;
- ✓ monitoring methods/devices ;
- ✓ those responsible for monitoring ;
- ✓ the follow-up period.

Each of the elements of the implementation mechanism should include a monitoring mechanism with the objective of :

- ✓ verify the effectiveness and efficiency of the implementation of the selected mitigation measures ;
- ✓ to implement the corrective measures in the environmental management plan.

This is a fundamental operation which consists of verifying the assumptions made concerning the sources of impact, the resources allocated and the environmental protection measures.

### **9.2. Environmental monitoring / control**

The monitoring and supervision plan makes it possible to identify the means and mechanisms to be put in place to ensure compliance with the measures retained in the GSLMP and with environmental requirements.

Environmental monitoring will focus on **ASER**. The purpose of this environmental monitoring is to ensure compliance :

- measures to be included in project implementation files ;
- the conditions laid down by the environmental code, the implementing decrees and the relevant texts relating to environmental management;
- the various laws, regulations and requirements in the field of hygiene and public health, management of the population's living environment, protection of the environment and natural resources.

It will concern all **ASER** interventions.

Environmental monitoring will ensure that :

- environmental protection is effectively respected throughout the project cycle;



- the environmental protection measures prescribed or provided for in the strategic environmental assessment are implemented and make it possible to achieve the objectives set in terms of environmental protection ;
- Corrective action is quickly initiated as required.

To this end, a monitoring programme will have to be drawn up prior to the activities and will have to cover the following phases:

<b>Project Phases</b>	<b>Activities to be monitored</b>
Study	Incorporation of environmental and safety management measures in project design
Elaboration of the specifications of the companies in charge of the works	Insertion of general and specific environmental clauses at the level of the D.A.O. and contractual clauses of the contracts.
Carrying out the work	Compliance with the provisions contained in the contracts
Infrastructure Operations	Compliance with environmental requirements

### **9.3. Environmental Follow-up Program**

The following table sets out the monitoring arrangements that will need to integrate the preparation of plans, specifications and the various tender and other contractual documents relating to the project.

**Table 16:** Environmental Management Plan Monitoring and Tracking Matrix

**A. PHASE STUDIES**

<b>Elements to be controlled</b>	<b>Indicators</b>	<b>Responsible for internal follow-up and monitoring</b>	<b>External monitoring officer</b>
<b>Integration of environmental measures in the design of equipment</b> ( <i>see point 7.2.3.2. Measures to be taken into account in equipment orders</i> )	Conformal certification of the installations before their assembly by a technical office.	ASER	<ul style="list-style-type: none"> <li>- CED</li> <li>- DREEC</li> </ul>
<b>Integration of environmental measures into the estimated detail and price schedule of companies</b>	All company unit quotes include GHG measures	ASER	<ul style="list-style-type: none"> <li>- CED</li> <li>- DREEC</li> </ul>

**B. BUILDING PHASE**

<b>Elements to be controlled</b>	<b>Indicators</b>	<b>Responsible for internal follow-up and monitoring</b>	<b>External monitoring officer</b>
<b>Documents to be produced by the company :</b> <ul style="list-style-type: none"> <li>- PGES - Building site</li> <li>- Monthly environmental monitoring reports</li> <li>- Organizational chart of the company</li> <li>- Rules of Procedure of the building site</li> <li>- Miscellaneous administrative authorizations</li> </ul>	<ul style="list-style-type: none"> <li>- Production lead time (01 months before installation on site)</li> <li>- Effectiveness and Frequency of Production</li> <li>- Presence of expertise in environmental and social management</li> <li>- Display of the rules in all areas of the construction site</li> <li>- Copy of authorization documents</li> </ul>	<ul style="list-style-type: none"> <li>- Control mission</li> <li>- ASER</li> </ul>	<ul style="list-style-type: none"> <li>- CED</li> <li>- DREEC</li> <li>- CRSE</li> </ul>
<b>Personnel responsible for the environmental management of the site :</b> <ul style="list-style-type: none"> <li>- Effective mobilization in the field</li> <li>- Competence</li> </ul>	<ul style="list-style-type: none"> <li>- Contract of employment</li> <li>- Quality of reports produced</li> </ul>	<ul style="list-style-type: none"> <li>- Control mission</li> <li>- ASER</li> </ul>	<ul style="list-style-type: none"> <li>- CED</li> <li>- DREEC</li> <li>- CRSE</li> </ul>
<b>Solid Waste Management</b>	<ul style="list-style-type: none"> <li>- Existence of receptacles</li> <li>- Approved landfills for inert construction waste</li> <li>- Existence of hazardous waste management procedures</li> <li>- Waste Tracking Slip Information</li> </ul>	<ul style="list-style-type: none"> <li>- Control mission</li> <li>- ASER</li> </ul>	<ul style="list-style-type: none"> <li>- CED</li> <li>- DREEC</li> <li>- CRSE</li> <li>- CPD</li> <li>- DGTSS</li> </ul>
<b>Management of hydrocarbons and waste oils</b>	<ul style="list-style-type: none"> <li>- Layout of storage areas</li> <li>- Presence of Absorbent Products</li> <li>- Frequency of waste oil recovery</li> </ul>	<ul style="list-style-type: none"> <li>- Control mission</li> <li>- ASER</li> </ul>	<ul style="list-style-type: none"> <li>- CED</li> <li>- DREEC</li> </ul>

<b>Elements to be controlled</b>	<b>Indicators</b>	<b>Responsible for internal follow-up and monitoring</b>	<b>External monitoring officer</b>
	<ul style="list-style-type: none"> <li>- Information on the final destination of the oils</li> <li>- Used Oil Tracking Slip Information</li> </ul>		<ul style="list-style-type: none"> <li>- DGTSS</li> <li>- CPD</li> </ul>
<b>Hygiene, Health and Safety of Personnel and Facilities</b>	<ul style="list-style-type: none"> <li>- Compliance with safety measures for the use of the products</li> <li>- Medical care agreement for site personnel signed with a hospital.</li> <li>- Sanitary Facilities &amp; Frequency of Maintenance of Sanitary Facilities</li> <li>- Drinking water supply</li> <li>- Construction site signage</li> <li>- Wastewater management devices.</li> </ul>	<ul style="list-style-type: none"> <li>- Control mission</li> <li>- ASER</li> </ul>	<ul style="list-style-type: none"> <li>- CED</li> <li>- DREEC</li> <li>- CPD</li> <li>- Hygiene service</li> </ul>
<b>Air quality and sound environment :</b> <ul style="list-style-type: none"> <li>-Dust control</li> <li>-Emission of construction machines and vehicles</li> <li>-Noise Control</li> </ul>	<ul style="list-style-type: none"> <li>- Frequency of watering the work area</li> <li>- Limitation of the speed of traffic</li> <li>- Technical visit of vehicles and construction machines</li> <li>- Wearing of PPE by workers</li> </ul>	<ul style="list-style-type: none"> <li>- Control mission</li> <li>- ASER</li> </ul>	<ul style="list-style-type: none"> <li>- CED</li> <li>- DREEC</li> <li>- CRSE</li> <li>- CPD</li> </ul>

Elements to be controlled	Indicators	Responsible for internal follow-up and monitoring	External monitoring officer
<p><b>Procedure for receiving and following up complaints and grievances:</b> It seems important to develop a grievance settlement procedure that will allow all actors concerned by possible nuisances resulting from the project activities to bring problems encountered on a daily basis to the level of the project management.</p>	<p>Opening of a grievance book at the construction site, where complainants can express their grievances.</p> <p><b>NB:</b> These documents will be collected each week by the company's HSE Manager for possible processing.</p> <p>The grievances recorded and the solutions provided will be presented in the company's monthly activity report and validated by the Control Mission. The results will be communicated to the complainants through posters and direct communication.</p>	<ul style="list-style-type: none"> <li>- Control mission</li> <li>- ASER</li> </ul>	<ul style="list-style-type: none"> <li>- CED</li> <li>- DREEC</li> <li>- CRSE</li> </ul>

### C. OPERATING PHASE

Elements to be controlled	Indicators	Responsible for internal follow-up and monitoring	Monitoring frequency	Responsible for monitoring
<p><b>Authorisation to operate for all infrastructures subject to ICPE regulation or any other sector regulation</b></p>	<p>All the infrastructures have operating licences.</p>	<p style="text-align: center;">ASER</p>	<p>Before commissioning the mini power plants</p>	<p style="text-align: center;">CED</p>

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<b>Accident risk management</b>	<ul style="list-style-type: none"> <li>- Training of plant operating personnel on the safety rules to be observed</li> <li>- Implementation of an Emergency Response Plan in case of accident / fire</li> <li>- Existence of a periodic maintenance plan</li> </ul>	<ul style="list-style-type: none"> <li>- ASER</li> <li>- Operators</li> </ul>	Continuous	<ul style="list-style-type: none"> <li>- CED</li> <li>- DREEC</li> <li>- CRSE</li> <li>- CPD</li> <li>- DGTSS</li> </ul>
<b>Availability and State of the means of intervention (ICPE)</b>	Annual Audit Report of the : <ul style="list-style-type: none"> <li>- anti-pollution kits</li> <li>- fire fighting measures</li> </ul>	<ul style="list-style-type: none"> <li>- ASER</li> </ul>	Annual	<ul style="list-style-type: none"> <li>- CED</li> <li>- DREEC</li> <li>- CRSE</li> <li>- CPD</li> <li>- DGTSS</li> </ul>

#### D. End of Project Life

Elements to be controlled	Indicators	Responsible for internal follow-up and monitoring	Monitoring frequency	Responsible for monitoring
<b>Plant decommissioning &amp; related infrastructure / site rehabilitation</b>	Elaboration & validation of the dismantling and site rehabilitation plan	ASER	06 months before cessation of activities	CED



### 9.3.1. Performance Indicators

The following table presents the monitoring indicators that will be used to assess the environmental performance of the companies involved in the work

Activities	Objectively Verifiable Indicators
Clean up the premises and dispose of solid waste at the authorized landfill.	- Number of sites cleaned up after construction - Number of Wild Deposits
Have the support of the beneficiary populations	- Awareness Programs - Number of villages informed
Inform and raise awareness among site personnel	Number of workers sensitized
Favouring the use of local manpower	of workers recruited locally
Putting in place a work signalling system	- Number and type of panels installed - Number of retarders made
Dispose of the excavated material in authorized areas.	Number of Wild Deposits
Provide site personnel with PPE	Number of workers equipped
Preventing the uncontrolled discharge of solid waste	Presence of solid objects from the building site
Reforestation of deforested areas with appropriate species	Reforested areas
Observe speed limits	- Number of contraventions - Number of accidents
Stripping and cleaning areas after completion of work	- Number of sites cleaned up
Ensure implementation of the ESMP	Implementing device put in place

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**Table 17:** Cost of GHG measures and activities

Component	Activities / Measures	Unit	Cost per unit	Quantity	Total Cost (CFA F)	Financial Manager
<b>Institutional measures</b>						
Operationalisation of the PCGES	DEEC / ASER Convention	Package	Package	Package	300.000.000	ASER
<b>Business planning</b>						
Integration of environmental and social measures and requirements into CADs	<b>Elaboration of environmental and social prescriptions/clauses to be inserted in project files</b> <ul style="list-style-type: none"> <li>- Carrying out the screening</li> <li>- Validation of the measures resulting from the screening</li> </ul>	Package	Package	800	PM (taken into account in the DEEC / ASER convention)	ASER
<b>Integration of site environmental clauses in the contract:</b> provisions to be made during site installations to ensure environmental protection.						
Construction site installation	Presence of an HSE expert on key company and control mission personnel	H/month		Project duration	PM	- Company - Control mission
	<b>Raising awareness of the company's personnel in terms of Health and Safety at Work</b> Organization of : <ul style="list-style-type: none"> <li>- First aid training</li> <li>- Raising awareness on health and safety at work</li> <li>- Sensitizing electricians to wear appropriate gloves and footwear to avoid electrocution during testing</li> <li>- Training on the respect of safety measures and internal rules of the construction site</li> </ul>	Package		Project duration	PM	Company

Component	Activities / Measures	Unit	Cost per unit	Quantity	Total Cost (CFA F)	Financial Manager																														
	<p><b>Provision of personal protective equipment</b></p> <p>→ Specific personal protective equipment (non-exhaustive list)</p> <table border="1"> <tr><td>NF EN 166</td><td>Eye protection (face shield)</td></tr> <tr><td>NF EN 344</td><td>Safety footwear</td></tr> <tr><td>NF EN 60598</td><td>Wallwasher lamps</td></tr> <tr><td>NF EN 60900</td><td>Hand tools for live working</td></tr> <tr><td>NF EN 61243</td><td>Voltage detectors</td></tr> <tr><td>NF C 18-400</td><td>Hand tools for live working</td></tr> <tr><td>NF C 18-415</td><td>Elastomer gloves for electricians (NF EN 60903)</td></tr> <tr><td>NF C 18-420</td><td>Insulating mats</td></tr> <tr><td>NF C 18-430</td><td>Ladders for work on electrical installations</td></tr> <tr><td>NF C 61-420</td><td>Cable reels</td></tr> <tr><td>NF S 72-202</td><td>Insulating protective helmet</td></tr> <tr><td colspan="2">Poles, blankets and insulation suits, etc.</td></tr> </table> <p>→ Conventional personal protective equipment</p> <table border="1"> <tr><td>Held at</td></tr> <tr><td>Boots</td></tr> <tr><td>Gloves</td></tr> <tr><td>Helmets</td></tr> <tr><td>Masks</td></tr> <tr><td>Harness</td></tr> </table>	NF EN 166	Eye protection (face shield)	NF EN 344	Safety footwear	NF EN 60598	Wallwasher lamps	NF EN 60900	Hand tools for live working	NF EN 61243	Voltage detectors	NF C 18-400	Hand tools for live working	NF C 18-415	Elastomer gloves for electricians (NF EN 60903)	NF C 18-420	Insulating mats	NF C 18-430	Ladders for work on electrical installations	NF C 61-420	Cable reels	NF S 72-202	Insulating protective helmet	Poles, blankets and insulation suits, etc.		Held at	Boots	Gloves	Helmets	Masks	Harness	Package		Project duration	PM	Company
NF EN 166	Eye protection (face shield)																																			
NF EN 344	Safety footwear																																			
NF EN 60598	Wallwasher lamps																																			
NF EN 60900	Hand tools for live working																																			
NF EN 61243	Voltage detectors																																			
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NF C 18-415	Elastomer gloves for electricians (NF EN 60903)																																			
NF C 18-420	Insulating mats																																			
NF C 18-430	Ladders for work on electrical installations																																			
NF C 61-420	Cable reels																																			
NF S 72-202	Insulating protective helmet																																			
Poles, blankets and insulation suits, etc.																																				
Held at																																				
Boots																																				
Gloves																																				
Helmets																																				
Masks																																				
Harness																																				
	Drinking water supply for all project personnel	Package		Project duration	PM	Company																														
	Installation under a retention basin for petroleum products and other polluting substances if the prefabricated systems proposed by some oil suppliers are not adopted.	Package		Project duration	PM	Company																														
	<p><b>Arrangement and maintenance of site sanitary facilities</b></p> <p>Installation of site toilets</p>	Package		Project duration	PM	Company																														

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Component	Activities / Measures	Unit	Cost per unit	Quantity	Total Cost (CFA F)	Financial Manager
	<b>Supply of waste collection and disposal equipment</b> <ul style="list-style-type: none"> <li>- the installation of pre-collection bins and a waste disposal system</li> <li>- covering and waterproofing of storage areas</li> <li>- the provision of washing and maintenance areas for machinery</li> <li>- the acquisition of used oil storage drums</li> </ul>	Package		Project duration	PM	Company
	Signing of a medical agreement for site personnel	Package		Project duration	PM	Company
	Miscellaneous costs incurred in proceedings, payment of taxes or various charges for obtaining various authorizations (environmental, mining, etc.)	Package		Project duration	PM	Company
<b>Measures to be included in the technical project in the equipment control phase (see point 7.2.3.2)</b>						
Related equipment and facilities	<b>Electrical risk management measures</b> <ul style="list-style-type: none"> <li>- the panels and electrical components shall be equipped with DC and AC surge arresters and protection devices in accordance with the international standard IEC 61024, which is the international reference in this field;</li> <li>- the installation will be equipped with a lightning conductor whatever the level of lightning strikes in the area where the solar power plant is installed;</li> <li>- the equipotentiality of all the conductive elements and metallic masses (except for the battery bank) by means of earth connections;</li> <li>- LV electrical structures will be installed and operated in accordance with NFC 15-100 ;</li> <li>- training and certification (type B2 and BP) of the operators who must install and operate the electrical equipment of the photovoltaic system;</li> <li>- a maintenance and preventive maintenance plan with visual inspections, electrical measurements, technical room checks, and replacement of defective elements;</li> <li>- for the technical room : <ul style="list-style-type: none"> <li>o it will be secure, insulated, air-conditioned and waterproof;</li> <li>o it will have fire walls of degree 2h;</li> <li>o The installation of the DC and AC protection boxes and the inverter must be installed at a height of more than 120 cm above the floor to make them inaccessible to children;</li> <li>o the presence of a self-contained emergency lighting unit including the mains power supply ;</li> </ul> </li> </ul>	Package		Project duration	PM	<ul style="list-style-type: none"> <li>- ASER</li> <li>- Company</li> </ul>

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Component	Activities / Measures	Unit	Cost per unit	Quantity	Total Cost (CFA F)	Financial Manager
	<ul style="list-style-type: none"> <li>○ the presence of an insulating stool and device for checking the absence of voltage and a rescue pole ;</li> <li>○ Safety signs and markings (safety instructions, dangers of the system and emergency telephone numbers) ;</li> <li>○ a set of personal protective equipment (PPE) in the form of electro-safety cases will be placed at the entrance to the technical room to allow intervention on the electrical structures in the event of an incident. Minimum PPE are to be provided such as: insulating helmet, anti-UV safety glasses, insulating gloves, insulating safety shoes;</li> <li>○ the maintenance and periodic cleaning of the premises and the prohibition of eating and/or drinking in or near the premises will help to control rodents ;</li> <li>○ Suitable and sufficient extinguishing means shall be provided for extinguishing fires of electrical origin (2 kg and 6 kg CO<sub>2</sub> extinguishers).</li> </ul>					
	<p><b>Measures to reduce the risk of fire in electrical substations</b></p> <ul style="list-style-type: none"> <li>- Choice of electrical equipment meeting strict technical standards and flame-retardant cables;</li> <li>- Smoking ban in the technical room and its surroundings;</li> <li>- Training in the use of fire-fighting means.</li> </ul>	Package		Project duration	PM	<ul style="list-style-type: none"> <li>- ASER</li> <li>- Company</li> </ul>
	<ul style="list-style-type: none"> <li>- Management of pollution risks at the equipment level (compliance with standards)</li> <li>- Provide a chimney of at least 10 m in length for all installations/equipment with a channelled discharge of atmospheric pollutants (generators, etc.).</li> <li>- Take into account the noise level not to exceed 85 A-weighted decibels (dB -A-) for all equipment controls.</li> <li>- Take into account the supply of PPE adapted to the equipment.</li> <li>- Take into account the fire-fighting means and the necessary measures, adapted to the nature of the activities on each site/installation.</li> <li>- Choosing soundproof groups ;</li> <li>- Train operating personnel in health and safety and risk management ;</li> <li>- Raise awareness among the surrounding populations on the functioning of the groups and the associated risks ;</li> <li>- Provide the appropriate PPE and require it to be worn for the maintenance of the units;</li> <li>- Avoid, as far as possible, the storage of lubricants and waste oils on site ;</li> <li>- Have a PS-50 type fire extinguisher and sandbox near each unit.</li> <li>- The batteries will be completely closed and delivered without external acid;</li> </ul>	Package		Project duration	PM	<ul style="list-style-type: none"> <li>- ASER</li> <li>- Company</li> </ul>

	<b>RURAL ELECTRIFICATION PROJECT IN SEVEN (07) ADMINISTRATIVE REGIONS OF SENEGAL (Kaffrine, Kaolack, Fatick, Kolda, Kédougou, Tambacounda and Saint-Louis)</b> <b>Environmental &amp; Social Assessment Report</b> <i>(Preliminary Report)</i>	<b>Provisional Version 12/01/2020</b>
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Component	Activities / Measures	Unit	Cost per unit	Quantity	Total Cost (CFA F)	Financial Manager
	<ul style="list-style-type: none"> <li>- A retention shall be built into each battery bank of capacity equal to 100% of the total volume of electrolyte contained in all cells of the bank;</li> <li>- The shielding of the battery terminals and non-insulated conductors ;</li> <li>- The training of personnel in health and safety and raising public awareness of risk management;</li> <li>- The provision of an eye washer kit for rinsing in case of accidental contact with sulphuric acid ;</li> <li>- Used batteries will not be stored in residential areas.</li> </ul>					
<b>General Measures</b>						
Health	<p><b>Health awareness and prevention of STI risks</b>            Organisation of awareness campaigns by an independent organisation specialised in the field and approved by the Project Owner.</p> <p>The price covers :</p> <ul style="list-style-type: none"> <li>- the organisation of awareness campaigns on STI risks</li> <li>- voluntary HIV/AIDS testing and condom distribution</li> <li>- miscellaneous expenses related to collaboration with associations and Local Committees for the Fight against HIV/AIDS</li> </ul>	Package		Project duration	120.000.000	<ul style="list-style-type: none"> <li>- ASER</li> <li>- Company</li> </ul>
Raising Public Awareness	<p><b>Raising awareness of safety and preservation of infrastructure</b>            Organization of safety and infrastructure protection awareness campaigns with the target audience: local populations and communities.</p> <p>It covers:</p> <ul style="list-style-type: none"> <li>- the recruitment of an NGO/Organization</li> <li>- the organisation of campaigns at the level of the localities concerned</li> <li>- the production of leaflets and any other support to raise awareness among the populations in the area of implantation</li> <li>- the production of summary reports.</li> </ul> <p><b>Training of the population / Operators on the handling of fire protection equipment.</b></p>	Package		Project duration	150.000.000	<ul style="list-style-type: none"> <li>- ASER</li> <li>- Company</li> </ul>
Security	<p><b>Implementation of security measures :</b></p> <ul style="list-style-type: none"> <li>- the appropriate markings ;</li> <li>- management of accidental spills of hazardous materials.</li> </ul>	Package		Project duration	90.000.000	<ul style="list-style-type: none"> <li>- ASER</li> <li>- Company</li> </ul>

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Component	Activities / Measures	Unit	Cost per unit	Quantity	Total Cost (CFA F)	Financial Manager
Folding of the construction site	General clean-up work on sites occupied by the Company, the clean-up of polluted sites, the elimination of waste in accordance with the standards in force, the withdrawal and restoration of all sites operated by the Company	Package	PM	PM	10% of the market as an environmental guarantee	Company
Support for Communities	<b>Support to local populations during the works phase:</b> - Miscellaneous support to populations				PM	- ASER - Company
<b>End of life of "Projet"</b>						
Site Remediation	<b>Elaboration &amp; validation of the dismantling / rehabilitation plan of the site</b>	Package		01	Fixed price : 115.000.000	- ASER
<b>Control measures, monitoring and supervision of the implementation of the SMCPP</b>						
Monitoring and supervision SEMP	<b>Mobilization of an environmental expert within ASER</b>	Package		Project duration	PM	ASER
	<b>Miscellaneous costs of the Administration's participation in the implementation of the accompanying measures</b>  Coverage of expenses relating to the missions of the various members of the Administration who may be called upon in environmental monitoring.	PM			PM (taken into account in the DEEC / ASER convention)	ASER



## CHAPTER 10: RECAP OF ESTIMATED COSTS OF ENVIRONMENTAL AND SOCIAL MEASURES

The estimated costs of environmental and social measures are summarized below:

### 10.1. Estimated costs of general environmental and social management measures

Activities	Quantity	Cost per unit (FCFA)	Total cost (FCFA)
Environmental and social monitoring	Package	Package	150 000 000
Environmental and social monitoring (support to DEEC)	Package	Package	300,000,000 (Work)
	Annual package	Package	25,000,000 (Commissioning)
Evaluation (mid-term and final)	2 evaluations	25 000 000	50 000 000
Elaboration & validation of the dismantling / rehabilitation plan of the site	Package	Package	115 000 000
<b>TOTAL</b>			<b>640 000 000</b>

### 10.2. Estimated cost of specific environmental and social management measures

Activities	Quantity	Cost per unit (FCFA)	Total cost (FCFA)
Miscellaneous authorizations	Package	Package	70 000 000
Compensatory Reforestation	PM	PM	PM
<b>TOTAL</b>			<b>70 000 000</b>

### 10.3. Costs of Training and Awareness Raising measures

Actors concerned	Themes	Quantity	Cost per unit	Total cost
<b>Training</b>				
- CRSE - Local elected officials	<b>Module 1: Environmental and Social Assessment</b> - Procedure definition of environmental and social management measures and impact indicators	1 workshop / Region	Package	80 000 000
- CRSE - Companies	<b>Module 2: Training on Environmental and Social Monitoring</b> - Knowledge of the environmental monitoring process ; - Environmental and social monitoring methodology ; - Environmental and social monitoring indicators.	1 workshop / Region	PM	PM (taken into account in the DEEC-ASER convention)
Workers	<b>Module 3: HSE training</b> - Training & awareness of security risks related to certain tasks ; - Fire Fighting Procedures and Emergency Response ;	Continuous	PM	PM

	- Training on the risks associated with construction sites and safety procedures to be followed (meaning of sound signals and rules to be followed in the event of a sound signal, etc.).			
Operators	<p><b><u>Module 4:</u> HSE training</b></p> <ul style="list-style-type: none"> <li>- Training &amp; awareness on safety risks related to solar power plants ;</li> <li>- Firefighting procedures and emergency response in solar power plants.</li> </ul>	1 workshop / Region		70.000.000
<b>Information and Awareness Raising</b>				
<ul style="list-style-type: none"> <li>- People,</li> <li>- Administrative authorities</li> <li>- Local Authorities</li> </ul>	<ul style="list-style-type: none"> <li>- Information on the start and duration of the work</li> <li>- Information on safety procedures and impacts related to the work</li> </ul>			PM (Taken into account in company contracts)
<b>TOTAL</b>				<b>150 000 000</b>



## **Annexes**

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### **Technical annexes**

1. Environmental acceptance form
2. Preliminary screening form
3. Environmental and Social Tracking Sheet
4. General environmental clauses
5. Measures to be included in the estimate

### **General Annexes**

6. TOR of the study
7. Bibliography



## Appendix 1: Environmental type-approval certificate

MINUTES OF ENVIRONMENTAL ACCEPTANCE OF THE WORKS					
Identification					
Project Title :					
Start Date :					
Completion Date :					
Duration of the project :					
Contractors for the execution of the work					
Company with contract reference					
Engineer with contract reference					
Composition of the reception team					
ASER - Control mission		Company		Technical Services	
First and Last Name	Function	First and Last Name	Function	First and Last Name	Function
Brief description of the work					
Status and validity of permits and authorizations for site facilities					
Sites/Infrastructures/Equipment		Location		Situation/Validity	
Lifebase					
Industrial base					
Mechanical workshop					
Prefabrication area					
Concrete plant					
Soil cement plant					
Water supply boreholes					
Storage area for hazardous products					
Washing area for vehicles and machines					
Fuel storage tanks					
Generator set					
Management of assets and properties impacted by the business					
N°		Yes	No	N/A	Photo No.
1.	Compensation of all losses for the construction of deviations	Yes	No	N/A	
2.	Compensations of all losses for the construction of the industrial base	Yes	No	N/A	



3. List of unresolved grievances (conciliation book)	Yes		No		N/A		
<b>Borrowing and Career Management</b>							
N°							Comments/Photo No.
1. The slopes have been regaled	Yes		No		N/A		
2. The site has been revegetated							
3. There are traces of erosion							
4. Erosion is attacking the surrounding land.							
5. Erosion is attacking the waterways							
4. Slopes are steep and prone to erosion.							
5. Vegetation currently covers in %							
6. There are still buildings on the site							
7. There are various wastes on the site							
8. The population uses the site (agriculture, animal husbandry, etc.)							
9. There's traces of oil or fuel on the ground.							
N/A = Not Applicable. If Not Applicable Explain why							
N°	Explanation						
<b>Freehand sketch</b>							
<b>Legend</b>							
Note							
<p><b>NB: For each site, a freehand drawing showing schematically and approximately the initial state of the loan following exploitation must be made. The following aspects: contour, deep areas, steep slope areas and rehabilitation proposals (planting areas, slope softening areas, ponds and reservoirs, access ramps to ponds for livestock and users) should be highlighted.</b></p>							
<b>Rehabilitation of bases and fixed installations</b>							
<b>Becoming temporary facilities</b>							
N°							Comments/Photo No.
1. The future of the life bases is clearly defined (maintenance or demolition)	Yes		No				
2. The installations to be dismantled are determined and the dismantling completed.	Yes		No				



3. The facilities to be maintained for the guarantee period shall be identified and the measures applicable during this period clearly listed.	Yes		No			
<b>Site Remediation</b>						
N°						Comments/Photo No.
1. Surfaces contaminated with used oil have been stripped and conditioned.	Yes		No		N/A	
2. The water bodies were contaminated with hydrocarbon products...	Yes		No		N/A	
3. The soil is polluted by hydrocarbon products.	Yes		No		N/A	
4. The site has stagnant water due to depressions created during the work.	Yes		No		N/A	
5. The fate of the borrow pits and quarry areas is clearly defined.	Yes		No		N/A	
6. All of the borrowed areas exploited as part of the works (DAO and supplementary) have been rehabilitated.	Yes		No		N/A	
7. Deposit sites are rehabilitated (disposal of residues, site clean-up, etc.).	Yes		No		N/A	
8. Quarrying continues	Yes		No		N/A	
9. The quarries are no longer exploited	Yes		No		N/A	
10. Quarry rehabilitation is completed and all crushing equipment dismantled.	Yes		No		N/A	
11. Security work is carried out (front fencing and crushing area) and the site is cleaned up.	Yes		No		N/A	
<b>Waste Management</b>						
1. Waste oil is removed from the construction site via the approved supplier.	Yes		No		N/A	
2. Contaminated soils and materials are disposed of at an authorized site.	Yes		No		N/A	
3. Used batteries and filters are removed from the construction site via an approved supplier.	Yes		No		N/A	
4. Household and similar waste is evacuated to an authorized site.	Yes		No		N/A	
5. The waste storage pit is demolished and the site is rehabilitated.	Yes		No		N/A	
6. The oil separator is drained, demolished and the site remediated.	Yes		No		N/A	
7. Fuel and lubricant storage facilities are drained, cleaned and dismantled.	Yes		No		N/A	
8. Used tyres are removed from the industrial base.	Yes		No		N/A	
9. The broken down machines are evacuated from the industrial base...	Yes		No		N/A	
10. Concrete areas, concrete from the anarchic dumping of concrete are stripped off	Yes		No		N/A	
11. Special waste (paint, sealant, etc.) is disposed of at an authorised site or via an approved supplier.	Yes		No		N/A	
12. Bitumen storage areas are stripped and the bitumen tailings are disposed of or reused.	Yes		No		N/A	
13. The septic tanks of the life base are emptied and demolished.	Yes		No		N/A	
14. Waste management is documented	Yes		No		N/A	
15. The entire site is free of waste	Yes		No		N/A	



<b>Cleaning and site restoration along the fence wall</b>							
1. The waterways are open at the various hydraulic structures (cofferdams and diversions are evacuated).	Yes		No		N/A		
2. Remaining material deposits along the fence wall are evacuated to appropriate sites.	Yes		No		N/A		
3. Natural waterways are cleaned and excavated material is disposed of at appropriate sites.	Yes		No		N/A		
<b>Management of wood products</b>							
1. The company's commitments for the recovery of wood from the clearing are fully respected.	Yes		No		N/A		
2. All clearing timber was transported and deposited at the sites indicated.	Yes		No		N/A		
<b>Production of reports</b>							
All environmental, social, health and safety management reports have been developed and are available.	Yes		No		N/A		
<b>Situations of environmental measures and related activities provided for in the contract</b>							
	Satisfactory		Unsatisfactory		RESERVES		
1. Alignment Shaft Plantations							
2. Awareness raising on HIV/AIDS							
3. Awareness/information of the population on the work							
4. Reforestation of loan sites							
5. Flood control measures upstream and downstream of airport drainage structures							
6. School fencing and gates							
7. Closure of health centres							
8. Closing of the markets							
9. Preparation of the Integrated Environmental and Social Action Plan							
10. Implementation of the Integrated Environmental and Social Action Plan							
11. Costs of measures to implement the monitoring and follow-up programmes							
12. Compensatory Reforestation							
13. Vegetation stabilization of embankments							
14. Provision for awareness-raising action to promote respect for airport infrastructures							
15. Traffic Management							
16. Relocation of merchants affected by the work							
17. Support for the management of household waste in the neighbourhoods through which it passes							



**PHOTOS**

#	#
#	#
#	#



### FINDINGS SYNTHESIS

HIGHLIGHTS	RESERVES		ENVIRONMENTAL RECEPTION		Comments
	minors	major	pronounced	unspoken	

### VISAS

<u>For the Monitoring Mission</u>		<u>For the Company</u>		<u>ASER</u>	
Name and surname	Subscription	Name and surname	Subscription	Name and surname	Subscription



Appendix 2: Screening form

Project title:.....

Sector :.....

Situation : Region :..... / Department :.....

District : . . . . . / Village :.....

Neighborhood:.....

(Strike out what doesn't apply)

Persons in charge (contact persons) :

(1).....

(2).....

Person responsible for completing this form :

First & Last Name :.....

Function:.....

Landline telephone:..... E-mail :.....

Date:..... Signatures:.....

PART A: Brief Project Description

Information on the type and dimensions of the project :

Information on all activities to be carried out :

Table with 2 columns: Phases of site preparation, Phases of construction/rehabilitation. 5 rows.

Information on the operation of the facility, including support activities and resources required to operate it (roads, drainage sites, water supply, energy requirements, human resources, etc.) Describe in a separate note if necessary.

.....



.....  
 .....  
 .....  
 .....

**PART B: Identification of Environmental and Social Impacts and Consultations**

<b>Environmental and Social Concerns</b>	<b>yes</b>	<b>no</b>	<b>Observation</b>
<b>Natural Resources</b>			
1. Will the project require large volumes of building materials from local natural resources (sand, gravel, laterite, water, timber, etc.)?			
2. Will the project require significant land clearing?			
3. Can the project cause variations in groundwater levels or stream flow?			
4. Can the project lead to a qualitative and quantitative decrease in natural resources (water, timber, poaching, logging, mining, etc.)?			
<b>Biological diversity</b>			
5. Is the project likely to cause effects on rare, vulnerable and/or economically, ecologically, culturally or economically important species?			
6. Are there any areas of environmental sensitivity that could be adversely affected by the project? (forest, wetlands, lakes, rivers, seasonal flooding areas...)			
<b>Protected Areas</b>			
7. If the project is close to a protected area (national park, reserve, classified forest, World Heritage site, etc.), could it negatively affect its ecology?			
<b>Geology and soils</b>			
8. Are there geologically unstable areas or soils susceptible to severe degradation (erosion, landslide, collapse)?			
9. Are there areas at risk of salinization?			
<b>Landscape / aesthetic</b>			
10. Would the project have an adverse effect on the aesthetic value of the landscape?			
<b>Historical, archaeological or cultural sites</b>			
11. Could the project change one or more historical, archaeological, or cultural sites (through excavations, visitation, etc.)?			
<b>Loss of assets, goods and services</b>			
12. Will the project trigger the temporary or permanent loss of crops, farmland, pasture, fruit trees, equipment (attic, toilets, kitchens, etc.), etc.?			
<b>Pollution and nuisances</b>			
13. Could the project cause a high level of noise?			
14. Is the project likely to generate solid and liquid waste? If "yes", recommend a plan for their collection and disposal with appropriate equipment.			
15. Could the project affect the quality of surface water, groundwater, drinking water sources?			
16. Is the project likely to affect the atmosphere (dust, various gases)?			
17. Does the project involve the use of equipment containing <b>PCBs</b> (polychlorinated biphenyls) or any application of a Persistent Organic Pollutant (POP)? If Yes, please indicate the arrangements made for compliance with the relevant regulations.			



Environmental and Social Concerns		yes	no	Observation
<b>Biomedical waste</b>				
18. Is there a risk that the project will generate biomedical waste? If yes, describe the measures planned for their management (see <i>Biomedical Waste Management Plan</i> )				
<b>Social Inequalities, Conflict, Gender</b>				
19. Can the project lead to an increase in social inequalities?				
20. Can the project lead to incompatible uses or social conflicts between different users?				
21. Does the project disadvantage the integration of women and other vulnerable groups?				
<b>Health, Safety</b>				
22. Can the project induce risks of accidents for workers or the population?				
23. May the project cause health risks to workers or the public?				
24. Can the project lead to an increase in disease vectors?				
<b>Social environment</b>	Can the project lead to total or partial loss of assets (crops, farmland, buildings, etc.)?			
	Can the project lead to an increase in social inequalities?			
	Can the project lead to incompatible uses or social conflicts between the different users and owners of the territory (sacred places, traditional sites)?			
	Can the project lead to a displacement of labour (no recruitment on site)?			
<b>Socio-educational and health facilities</b>	Can the project negatively affect the functioning of the surrounding socio-educational and health infrastructures?			
<b>Cultural Heritage</b>	Is the project likely to affect sites of cultural, archaeological or historical importance?			
	The project beneficiary does not have a mechanism for the management, operation and maintenance of the project?			

### **PART C: Eligibility criteria for sites**

The following sites shall be excluded from the areas proposed or planned for the installation of project components:

1. **Sites that would involve the relocation of homes**
2. **Sites that would involve the displacement or loss of productive agricultural land.**
3. **3. Sites that would encroach on protected areas of natural habitat.**
4. **Sites that would have a negative effect on cultural heritage sites.**
5. **Sites that would impact on livestock or animal transhumance corridors.**



**PART D: Mitigation measures**

Based on the Impacts and Mitigation Checklist (document provided separately), briefly describe the mitigation or enhancement measures to be taken in the implementation of the project.

**PART D:**

Project classification and environmental work

Social work needed



**Appendix 3 : Environmental and Social Tracking Sheet**

Name of Monitoring Officer :.....  
 Structure :.....  
 Function :.....  
 Address (Tel/mail) :.....

1- The choice of storage location (at least 100m)

Compliant		
Non-conforming		

**Comments :**.....

2- Appointment of a Health/Safety/Environment Manager

Presence of the HSE Manager at company level		

**Comments :**.....

3- Compliance with safety rules in the workplace

Wearing helmets		
Wearing of gloves		
Boot wear		
Hide and seek		
Glasses		
Combination		

**Comments :**.....

4- The preservation of trees in construction areas

Compliant		
Non-conforming		

**Comments :**.....

5- Protection of construction site areas



Worksite signage	Present	
	Absent	

6- Waste management at the construction site level

Types of waste		
Delimitation mode		
Place of storage		

Comments .....

7- The presence of a land use plan

Construction zones		
Planned developments		
Base life		

Comments :.....

8- Awareness raising on HIV-AIDS and STIs

Realized		
Not Achieved		

Comments :.....

9- Raising awareness on communicable diseases and malaria

Realized		
Not Achieved		

Comments :.....

10- Presence of a land use permit

Types of land use	Local authority permits	
-------------------	-------------------------	--



	Rental (lease contract)	
	Landowner's Permit	

Rental	Duration	
	Amount	
Landowner's Permit	Amount	
	Validity	
Local authority permits	Duration	

**Comments :**.....

**11- Use of manpower**

Employment of labour	Category		Man	Woman
	Local workforce			
Foreign labour				
Mixed workforce				
Others				

**Comments :**.....

**12- Site water supply**

Drinking water supply	Available	
	Not available	
Construction site water supply		

**Comments :**.....

Dated at.....

The company

The control office



#### **Annex 4:** Environmental clauses to be included in contract work packages

The present clauses are intended to assist those responsible for drawing up tender documents and contracts for the execution of the works (technical specifications), so that they can incorporate into these documents requirements that will optimise the protection of the environment and the socio-economic environment. The clauses are specific to all worksite activities that may be a source of environmental and social nuisance. They must be included in the execution files for the work of which they form an integral part.

#### ***Compliance with national laws and regulations :***

The Contractor and its subcontractors shall: know, respect and apply the laws and regulations in force in the country relating to the environment, disposal of solid and liquid waste, discharge and noise standards, working hours, etc.; take all appropriate measures to minimise damage to the environment; take responsibility for any claims relating to failure to respect the environment.

#### ***Permits and authorizations prior to work***

All work must be subject to a prior information and administrative authorisation procedure. Before starting the works, the Contractor must obtain all the necessary permits for the works provided for in the road project contract: permits issued by local authorities, forestry services (in the case of deforestation, pruning, etc.), network managers, etc. The Contractor shall consult with the local residents before the commencement of the works and may make arrangements with them to facilitate the progress of the works.

#### ***Kick-off meeting***

Prior to the commencement of the works, the Contractor and the Employer, under the supervision of the National Co-ordinations, shall hold meetings with the authorities, representatives of the populations located in the Project area and the relevant technical services, to inform them of the consistency of the works to be carried out and their duration, the routes involved and the locations likely to be affected. This meeting will also enable the project owner to collect the observations of the populations, to raise their awareness on environmental and social issues and on their relations with the workers.

#### ***Site Preparation and Release - Respect for Rights-of-Way and Alignments***

The Contractor shall inform the populations concerned before any destruction of fields, orchards and market gardens required under the Project. The release of the right-of-way must take place according to a schedule defined in agreement with the affected populations and the project owner. Before installation and the commencement of the works, the Contractor shall ensure that compensation/compensation is actually paid to the entitled parties by the Employer. The Contractor shall respect the rights-of-way and routes defined by the Project and shall not stray from them under any circumstances. All damages related to the non-observance of the defined routes and rights-of-way are the responsibility of the company and repairs are at its expense.

#### ***Dealer network tracking***



Prior to the commencement of the works, the Contractor shall instruct a procedure for locating the concessionaires' networks (drinking water, electricity, telephone, sewerage, etc.) on a plan which shall be formalised by a Minute signed by all parties (Contractor, Prime Contractor, concessionaires).

### ***Liberation of the public and private domains***

The Contractor must be aware that the public utility perimeter related to the operation is the perimeter likely to be affected by the works. Work may only begin in areas affected by private rights-of-way when they are released following an acquisition procedure.

### ***Environmental and Social Management Program***

The Contractor shall draw up and submit, for the approval of the Employer, a detailed environmental and social management programme for the worksite which shall include : (i) a land-use plan indicating the location of the living base and the different areas of the building site according to the components of the project, the planned locations and a description of the facilities; (ii) a waste management plan for the building site indicating the types of waste, the type of collection envisaged, the place of storage, the method and place of disposal ; (iv) an accident management and health preservation plan specifying the risks of major accidents which could endanger the safety or health of staff and/or the public and the safety and/or health preservation measures to be applied under an emergency plan.

### ***Posting of rules of procedure and staff awareness***

The Contractor shall post internal rules and regulations prominently in the various facilities of the base, specifically prescribing: respect for local customs and habits; protection against STI/HIV/AIDS; hygiene rules and safety measures. The Contractor shall sensitize its personnel, in particular on the respect of the customs and habits of the populations of the region where the work is carried out and on the risks of STIs and HIV/AIDS.

### ***Employment of local labour***

The Contractor shall be obliged to employ (apart from his senior technical staff) as much labour as possible in the area where the works are carried out. If qualified personnel cannot be found on site, it is permissible to hire labour outside the working area.

### ***Respect for working hours***

The Contractor shall ensure that working hours comply with the national laws and regulations in force. Any derogation is subject to the approval of the Project Manager. The Contractor shall, as far as practicable (unless an exception is granted by the Employer), avoid carrying out work during rest hours, Sundays and public holidays.

### ***Protection of site personnel***

The Contractor shall provide site personnel with correct work clothes that comply with regulations and are in good condition, as well as all the protection and safety accessories specific to their activities (helmets, boots, belts, masks, gloves, goggles, etc.). The Contractor shall ensure that protective equipment is scrupulously worn at the worksite. This must be constantly monitored and, in the event of non-compliance, coercive measures (warning, dismissal, dismissal) must be applied to the staff concerned.



### ***Health, Safety and Environment Manager***

The Contractor must appoint a Health/Safety/Environment Manager who will ensure that the rules on health, safety and environmental protection are strictly followed by all and at all levels of execution, both for the workers and for the population and other persons in contact with the worksite. It must set up a routine and emergency medical service at the life base, adapted to the number of its staff. The Contractor shall prohibit public access to the worksite, protect it with markers and signs, indicate the various access points and take all necessary measures to ensure order and safety in order to avoid accidents.

### ***Measures against traffic obstructions***

The Contractor shall avoid obstructing public access. It must permanently maintain traffic and access for local residents during the work. The Contractor shall ensure that no excavation or trench is left open at night without adequate signage accepted by the Employer. The Contractor shall ensure that the temporary diversions permit safe movement.

### ***Site withdrawal and redevelopment***

On any site release, the Contractor shall leave the premises suitable for their immediate assignment. It cannot be released from its commitments and its responsibility for their use without it having had this good condition formally recorded. The Contractor shall carry out all the work necessary to restore the site. He is required to pack up all his equipment and materials and may not leave them on the site or in the vicinity. Upon completion of the works, the Contractor shall (i) remove equipment, solid and liquid wastes, excess material, fences, etc.; (ii) rectify drainage defects and reclaim all excavated areas; (iii) reforest the areas originally cleared with appropriate species, in consultation with the local forestry services; (iv) protect the works that remain hazardous (wells, open trenches, slopes, projections, etc.); (v) remove all debris and debris from the works; (vi) remove all debris from the excavated areas; (vii) remove all debris from the excavated areas; (viii) remove all debris from the excavated areas; (ix) reforest the areas originally cleared with appropriate species, in consultation with the local forestry services; (x) protect the works that remain hazardous (wells, open trenches, slopes, projections, etc.); and (xi) remove all debris from the excavated areas, including debris from the excavated areas, and remove all debris from the works.); (vi) make pavements, sidewalks, gutters, ramps and other works rendered to the public service functional; (vi) decontaminate soiled soils (contaminated parts must be dug up and filled with sand); (vii) clean and destroy emptying pits. After all the equipment has been removed, a report recording the restoration of the site must be drawn up and attached to the report of acceptance of the work.

### ***Protection of unstable areas***

When dismantling works in unstable environments, the Contractor shall take the following precautions to avoid increasing soil instability: (i) avoid heavy traffic and overloading in the area of instability; (ii) maintain as much vegetation cover as possible or replenish it by using appropriate local species where there is a risk of erosion.

### ***Notification of findings***

The Employer shall notify the Contractor in writing of all cases of failure or non-fulfilment of environmental and social measures. The Contractor shall rectify any failure to comply with the



requirements duly notified to him by the Employer. The Contractor shall bear the cost of resumption of work or additional work resulting from non-compliance with the Clauses.

### ***Sanction***

Pursuant to the contractual provisions, failure to comply with the environmental and social clauses, duly noted by the Client, may be grounds for termination of the contract. The Contractor who has been terminated for non-application of the environmental and social clauses is liable to sanctions up to and including suspension of the right to bid for a period determined by the Employer, with a reduction in price and a freeze on the holdback.

### ***Work signage***

The Contractor shall place, prior to the opening of the works and whenever necessary, pre-signalling and signalling for long-distance worksites (leaving quarries or life bases, circuits used by the machinery, etc.) which comply with the laws and regulations in force.

### ***Protection of agricultural areas and structures***

The work schedule must be established in order to limit the disruption of agricultural activities. In particular, the main periods of agricultural activity (sowing, harvesting, drying, etc.) must be known in order to adapt the timetable to these periods. The Contractor shall identify the places where passages for animals, livestock and persons are required. Here again, the involvement of the population is paramount.

### ***Protection of wetlands, fauna and flora***

The Contractor is prohibited from carrying out temporary works (storage and parking areas, bypass or work paths, etc.) in wetlands. In the case of plantations, the Contractor shall adapt to the local vegetation and take care not to introduce new species without the advice of the Forest Services. For all deforested areas outside the right-of-way and required by the Contractor for the purposes of his work, the topsoil extracted shall be set aside.

### ***Protection of sacred sites and archaeological sites***

The Contractor shall take all necessary steps to respect and not to damage cultural and religious sites (cemeteries, sacred sites, etc.) in the vicinity of the works. To do so, it will have to make sure beforehand of their typology and their implementation before starting the works. If, in the course of the Works, remains of cultural, historical or archaeological interest are discovered, the Contractor shall follow the following procedure: (i) stop work in the affected area; (ii) immediately notify the Employer who must take immediate steps to protect the site from destruction; a protective perimeter must be identified and marked on the site and no activities must take place there; (iii) refrain from removing and moving objects and remains. Work must be suspended within the protection perimeter until the national body responsible for historic and archaeological sites has given permission to continue.

### ***Tree felling and deforestation measures***

In the event of deforestation, felled trees must be cut down and stored in places approved by the Project Manager. Riparian populations must be informed of the possibility that they can dispose of this wood at their convenience. Felled trees must not be left on site, burned or run off under earth-moving materials.



### ***Prevention of bush fires***

The Contractor shall be responsible for the prevention of bush fires over the extent of its works, including borrow pits and accesses. He must strictly observe the instructions, laws and regulations issued by the competent authorities.

### ***Solid Waste Management***

The Contractor shall deposit household waste in watertight bins which shall be emptied periodically. In the event of evacuation by trucks from the construction site, the skips must be sealed so as not to allow any waste to escape. For reasons of hygiene, and to avoid attracting vectors, daily collection is recommended, especially during hot periods. The Contractor shall dispose of or recycle waste in an environmentally sound manner. The Contractor shall transport the waste, if possible, to existing disposal sites.

### ***Protection against noise pollution***

The Contractor shall be required to limit noise from the worksite which may seriously disturb local residents, either by excessively long duration or by extending it outside normal working hours. The thresholds not to be exceeded are: 55 to 60 decibels during the day; 40 decibels at night.

### ***Prevention of STI/HIV/AIDS and work-related diseases***

The Contractor shall inform and sensitize its staff on the risks related to STI/HIV/AIDS. It must make condoms against STI/HIV/AIDS available to staff.

The Contractor shall inform and raise the awareness of its staff on safety and health at work. It must ensure that the health of workers and local populations is preserved by taking appropriate measures against other diseases related to the works and the environment in which they take place: respiratory diseases due in particular to the large volume of dust and gas emitted during the works; malaria, gastroenteritis and other diarrhoeal diseases due to the high proliferation of mosquitoes, changes in climate and the quality of the water and food consumed; diseases endemic to the area.

The Contractor shall provide for the following preventive measures against the risk of disease : (i) Introduce the wearing of masks, uniforms and other suitable footwear; (ii) Systematically install infirmaries and provide site personnel free of charge with the basic medicines needed for emergency care.

### ***Pedestrian footbridges and riverside accesses***

The Contractor shall at all times ensure access to waterside properties and ensure the use of road and pedestrian entrances, display windows, by means of temporary bridges or footbridges fitted with guard rails, placed over trenches or other obstacles created by the works.

### ***Utilities and Relief***



The Contractor must maintain access to public and emergency services in all places. When a street is barred, the Contractor shall discuss with the Employer the arrangements for maintaining access for fire and ambulance vehicles.

### ***Site logbook***

The Contractor shall maintain a site log, in which shall be recorded any claims, deficiencies or incidents having a significant impact on the environment or an incident with the public. The site log is unique for the job site and notes must be written in ink. The Contractor shall inform the public in general, and the riparian populations in particular, of the existence of this journal, indicating where it may be consulted.

**Annex 5:** Reminder of the major GHG elements to be integrated into<sup>9</sup> markets

The Contractor shall incorporate the following elements in the evaluation of the contract costs :

N°	Environmental and social requirements
1	<b>Presence of environmental expertise on the site</b> - Recruitment of an environmental expert or a Quality Safety Environment expert and all the expenses related to his functions.
2	<b>Right-of-way preparation and release</b> - Information and awareness-raising for the populations concerned - Demolitions for the liberation of prisons
3	<b>Dealer Network Tracking</b>
4	<b>Construction site facilities</b> - Preparation - Sanitation and drinking water facilities - Security installations
5	<b>Protective equipment for site personnel</b> - Dress, boots, gloves, helmets, masks, etc. - First-aid medicine box - Medical follow-up
6	<b>Development of access and diversion roads</b> - Bypasses and temporary access roads - Pedestrian footbridges and riverside accesses
7	<b>Site and works signage:</b> This item covers the work and services relating to the installation of the panels
8	<b>Erosion prevention</b>
9	<b>Protective measures when transporting equipment and materials</b> - Irrigation of runways - Covering of trucks (tarpaulins, nets, etc.)
10	<b>Measures for the transport and storage of petroleum products</b> - Tight storage tanks on protected surfaces with a protection system and retention basin - Spill response equipment (absorbents, peat moss, booms, shovels, pumps, machinery, containers, gloves, etc.). ) - Communication equipment (radio transmitter, walkie-talkie, mobile phone) - Safety equipment (signage, etc.)
11	<b>Erosion Control - Slope Stabilization</b>

<sup>9</sup> Non-exhaustive measures that could evolve with screening



	<ul style="list-style-type: none"> <li>- laying of rockfill or gabions in areas with strong currents</li> <li>- reinforcement of banks and embankment soils by riprap, gabions, masonry riprap or plant protection</li> <li>- Reinforcement of downstream and upstream para-digs (riprap or gabions)</li> </ul>
<b>12</b>	<b>Protection of agricultural areas and structures:</b> compensation for agricultural expenses and loss of land
<b>13</b>	<p><b>Tree planting and protection of sensitive environments:</b> This item concerns the supply and planting of trees of species adapted to the natural environment to form screens along the roadside and in lateritic borrowing areas. It includes, in particular:</p> <ul style="list-style-type: none"> <li>- Redevelopment of temporary sites</li> <li>- Restoration of forest cover on forest land</li> <li>- Supply of plants, minimum height one meter;</li> <li>- Planting, protection, watering and maintenance until final acceptance;</li> <li>- Replacement in case of failure.</li> </ul>
<b>14</b>	<p><b>Awareness of workers</b></p> <p>This item covers the following work and services :</p> <ul style="list-style-type: none"> <li>- Awareness of the importance of environmental protection ;</li> <li>- Raising awareness of respect for the customs and habits of the people in the region where the work is carried out;</li> <li>- Raising awareness on safety and hygiene at work ;</li> <li>- Raising awareness of the risks of STIs and HIV-AIDS ;</li> <li>- Provision of condoms against STI/HIV/AIDS ;</li> <li>- Distribution of protective safety equipment (boots, gloves, helmets, etc.).</li> </ul>
<b>15</b>	<p><b>Opening and operation of lateritic borrowing areas</b></p> <p>This item covers the following work and services :</p> <ul style="list-style-type: none"> <li>- Consultations with landowners</li> <li>- Compensation to landowners;</li> </ul>
<b>16</b>	<b>Community Support</b>
<b>17</b>	<b>Site water supply:</b> Supply cistern, drilling, etc.
<b>18</b>	<p><b>Wastewater and solid waste management</b></p> <p>This item covers the following work and services :</p> <ul style="list-style-type: none"> <li>- Covering and waterproofing of storage areas</li> <li>- Disposal of surplus material</li> <li>- Purchase of waste receptacles</li> <li>- Construction of pits for burying biodegradable wastes</li> <li>- Recovery and disposal of waste from emptying</li> <li>- Construction of sanitary facilities (toilets, latrines, etc.)</li> <li>- Arrangement of washing and maintenance areas for machinery</li> <li>- Acquisition of storage drums for used oil</li> </ul>



**19 Site withdrawal and redevelopment**

- carry out all the necessary arrangements for the restoration of the premises
- remove temporary buildings, equipment, wood, waste, surplus materials, fences and other related items;
- rectify drainage defects
- Regulate all excavated areas
- clean and eliminate all forms of pollution
- compensate persons affected by the effects of pollution



## **Appendix 6: Terms of Reference for the mission**

# **REPUBLIC OF SENEGAL**

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**ONE PEOPLE - ONE GOAL - ONE FAITH**

-----

***RURAL ELECTRIFICATION PROJECT IN SEVEN (07)  
ADMINISTRATIVE REGIONS OF SENEGAL (FATICK, KAFFRINE,  
KAOLACK, KOLDA, KEDOUGOU, TAMBACOUNDA AND SAINT-  
LOUIS)***

## **STRATEGIC ENVIRONMENTAL ASSESSMENT**

January 2020



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## **Strategic Environmental Assessment Terms of Reference the rural electrification project in seven (07) administrative regions of Senegal: Fatick, Kaffrine, Kaolack, Kolda, Kédougou, Tambacounda and Saint-Louis.**

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### **1. Context of the study**

Senegal is committed to achieving universal access to electricity by 2025 to address the socio-economic objectives defined by the Senegal Emerging Plan by 2035. In this context, the rural environment remains the major challenge to achieving this objective given the inequalities observed so far in terms of access to electricity services.

To achieve this objective of universal access to electricity, the State of Senegal, through the ASER, plans :

- qualification of villages and associated design studies ;
- the supply and delivery of components ;
- installation and commissioning of the equipment ;
- Exploitation and dismantling ;
- project management, coordination and supervision.

In this context and in accordance with Senegalese legislation on environmental management and protection, ASER is launching this strategic environmental assessment to address environmental and social issues in the implementation of the different components of the project.

### **2. Brief project description and timeline**

#### ***2.1. The technical components of the Project***

1. Surveys & Engineering" component with the sensitization of the actors, the identification of the zones, studies and calculation notes by village ;
2. Civil Engineering" section with perimeter fences, slabs and studs for metal structures, foundations for posts and public lighting;
3. Electrification" shutter with the installation of the solar panels, cables, electronic components until the power supply is switched on;
4. Acceptance of works" component according to a procedure including mechanical completion (Cold Commissioning), energization (Hot Commissioning), provisional acceptance (mini-networks and residential installations) and final acceptance per village;
5. Operation and Maintenance" component.

#### ***2.2. The consistency of the work***

The project does not involve any earthworks, cuttings/fills, tree cutting (only brush clearing). The choice of the components is not yet final, but there will be no polluting materials, the



components are inert, the batteries will be delivered / closed without external acid, retention tanks will be installed, the groups will be protected. All electronic components will be placed in locked technical rooms (masonry solution or containers).

### **2.3. Target areas**

The areas targeted by the project are :

- the Fatick region;
- the Kaffrine region;
- the Kaolack area;
- the Kolda region;
- the Kédougou region;
- the Tambacounda region;
- the St. Louis area.

## **3. Objectives of the consultant's work**

The objectives of this strategic environmental assessment mission are to define the overall framework for addressing the environmental and social aspects of the project. Indeed, the project is composed of several sub-projects in separate regions and localities. The strategic environmental assessment (SEA) will identify the issues related to the project in a comprehensive manner and will have to define the most appropriate environmental and social management strategies based on their importance.

The strategic environmental assessment will analyse the institutional arrangements in place for proper management of the various components.

The SEA report should also analyse the capacity building needs of the actors in charge of implementing the programme as well as the actors in charge of monitoring and surveillance.

Timetables for the implementation of the various activities will be set out, as will the budgets and those responsible for implementation.

## **4. Scope of the study**

The study will focus on the environmental and social issues related to the implementation of the various project components in relation to the planned areas of intervention.

## **5. Documents to consult**

Various important technical documents will be consulted:

- the technical documents of the project ;
- national environmental regulations ;
- the standards of the technical and financial partners, notably the WADB;

## **6. Consultant's tasks**

The following specific tasks, among others, will be required:



- a.) Identify, assess and measure potential direct and indirect positive and negative issues and environmental and social risks in the project areas. This concerns in particular (i) the implementation and works phase and (ii) the operation (commissioning) and maintenance phase. This preliminary summary analysis of potential project issues will focus on the biophysical, socio-economic and cultural environments.
- b.) Propose a checklist of environmental and social issues encountered with appropriate corrective measures. The Consultant will present a summary table of the issues and their mitigation measures.
- c.) Develop a monitoring-evaluation framework for these measures by specifying the environmental and social indicators to be taken into account, as well as the monitoring methodology and monitoring tools (reference data, frequency of collection, responsibilities, etc.). The monitoring-evaluation programme should also include a specific environmental and social monitoring plan to ensure effective control of the environmental and social issues of the project.
- d.) Describe the mechanism and institutional arrangements for implementing the environmental and social management framework plan by clarifying the roles and responsibilities of the agencies and all stakeholders (at local, communal, regional and national levels) involved in its implementation.
- e.) Describe the process, mechanism and under what circumstances, if any, specific environmental assessments (i.e., limited or comprehensive assessment) for each infrastructure will be conducted. In particular, these include: decision making for the conduct of the EIA for each sub-project (if required), the preparation and approval of ToRs and EIAs for these infrastructures, as well as the implementation and monitoring of their ESMP.
- f.) Assess the capacity of the Government and the executing agencies involved in the implementation of the Environmental and Social Management Framework Plan, including awareness of the environmental and social issues of the project, and propose measures for awareness raising, institutional strengthening and/or technical capacity building of relevant stakeholders.
- g.) Prepare a summary budget of all actions and activities proposed in the SEA. This budget will also include an approximate cost of the proposed environmental management measures.
- h.) Develop a public consultation plan, involving all project stakeholders, including beneficiaries and those potentially affected by the project. This consultation plan is to be included as an appendix to the strategic environmental assessment report.

The strategic environmental assessment report will have to be submitted for approval to the Government of Senegal, which will validate the various recommended actions and authorize its publication. The master plan should then be published according to the guidelines applied to the project.



## 7. Content and outline of the study report

The SEA report will be structured around the following points:

- a) List of Acronyms ;
- b) A non-technical summary;
- c) An introduction describing the purpose of SEA, its objectives, principles and methodology;
- d) A description of the project highlighting the investment components, target areas, coordination and implementation arrangements;
- e) A summary and general presentation of the conditions of the natural (physical and biological), human, socio-economic and cultural environment of the project's intervention zones;
- f) The legal and regulatory framework and an overview of environmental safeguard policies applicable to electricity transmission and distribution infrastructure, as well as a discussion of the requirements of the different policies ;
- g) The institutional framework by detailing the institutional arrangements for the implementation ;
- h) Analysis of the project's environmental and social issues and the environmental and social mitigation or enhancement measures to be taken;
- i) The framework for monitoring and evaluation of the measures to be implemented with standard indicators, a monitoring schedule and the parties responsible for the implementation of this plan ;
- j) A description of the capacity building programme, training and technical assistance needed to implement the results of the SEA;
- k) A budget for implementing the SEA recommendations ;
- l) Technical annexes to assist in the implementation of SEA :
  - ✓ **General appendices :**
    - Abbreviations
    - SEA Authors
    - Bibliography
    - List of persons contacted and consulted
  - ✓ **Technical appendices**
    - an environmental selection grid
    - a checklist of measures
    - the criteria for choosing sites for locations
    - Typical Terms of Reference for Additional Environmental Studies (if applicable)
    - Environmental clauses.



## 8. Required expertise

The Consultant shall have proven experience in the preparation of environmental impact assessment documents and shall be approved by the Ministry in charge of the Environment of Senegal. He or she will need to be familiar with the requirements and procedures of funding agencies for environmental and social assessments.

His team will be composed of:

- an expert in environmental and social assessment, head of mission with at least ten years experience in the field ;
- an expert in pollution and nuisance management;
- an expert socio-economist;
- an electrical expert;
- a naturalist expert;
- an expert cartographer specializing in GIS.

## 9. Deliverables

The draft Strategic Environmental Assessment document should first be submitted to the proponent for review and comment.

It will then be submitted to the Senegalese Directorate of the Environment and Classified Establishments (DEEC) for validation.

The final version should be made available after taking into account the comments of the proponent and the CED in time for publication in the country and other important places.

Type of report	Deadline	Number of Copies
Scoping and categorization report	07 days after mission start	01 copy
Preliminary Report	02 weeks after the start of the mission	01 copy
Interim Report	08 weeks after the start of the mission	01 copy
Final Report	02 weeks after receipt of comments from ASER / BOAD	01 copy

## 10. Mobilization of logistics

The Consultant will mobilize all the necessary logistics to put his key personnel in the best conditions to carry out their mission.



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