



TOGOLESE REPUBLIC

Travail-Liberté-Patrie



**AGENCY FOR PROMOTION AND
DEVELOPMENT OF AGROPOLES IN TOGO**

STAPLE CROPS PROCESSING ZONES (SCPZ) PROGRAMME: PROMOTING SUSTAINABLE AGRICULTURAL VALUE CHAINS

TOGO

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

VOLUME 2.2

IDENTIFICATION, EVALUATION OF ENVIRONMENTAL IMPACTS
AND RISKS, ELABORATION OF THE ENVIRONMENTAL AND
SOCIAL MANAGEMENT PLAN (ESMP) AND THE RISK
MANAGEMENT PLAN (RMP) FOR THE DEVELOPMENT OF THE
IRRIGATED PERIMETERS AND THE SHALLOWS

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LIST OF ACRONYMS AND ABBREVIATIONS

ANGE	: Agence Nationale de Gestion de l'Environnement
APRODAT	: Agence de promotion des agropoles au Togo
AfDB	: African Development Bank
CCD	: Cantonal Development Committee
CHR	: Regional Hospital Centre
CHU	: University Hospital Centre
VOC	: Volatile Organic Compounds
CVD	: Village Development Committee
DI	: Inert Waste
OIW	: Ordinary Industrial Waste
DRERF	: Direction Régionale de l'Environnement et des Ressources Forestières (Regional Directorate for the Environment and Forest Resources)
EIES	: Environmental and Social Impact Study
PPE	: Personal Protective Equipment ETD
	: Enterprise, Territories & Development
FCFA	: Franc of the African Financial Community
GRAPHE	: Christian Research Group Actions for Human Promotion
ICAT	: Institute for Technical Advice and Support
IEC	: Information Education Communication
STI	: Sexually Transmitted Infection
ODD	: Objectives for Sustainable Development
WHO	: World Health Organisation
NGO	: Non-Governmental Organisation
RAP	: Resettlement Action Plan
PGES	: Environmental and Social Management Plan
PGR	: Risk Management Plan
GDP	: Gross Domestic Product
GDPA	: Gross Domestic Agricultural Product
PM	: For the record
PND	: National Development Plan
PNIASAN	: National Agricultural Investment and Food and Nutritional Security Plan
SRI	: Intensive Rice Growing System
ToR	: Terms of Reference
EU	: European Union
IUCN	: International Union for Conservation of Nature
HIV/AIDS	: Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS)

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INTRODUCTION

The economy of Togo is generally characterised as being weak with heavy dependence on agriculture. This accounts for about 47.6% of the nation's GDP followed by services (36.2%) and industry (16.2%) with the manufacturing sector accounting for less than 6.4%.

Between 2012 and 2019, there has been a continues decline in the sectoral contributions to GDP from the primary sector in favour of the secondary and tertiary sectors. This is in contrast to previous years that was largely dominated by massive investments in agriculture, livestock, forestry and fishing activities. Indeed, during this era, nearly 70% of the Togolese population were engaged in the primary sector, which is mostly dominated by agricultural activity.

According to the NDP (2018-2022), Togo has great ambition to reach a target growth rate of 7.6%. Thanks to flagship projects with high potential for massive job creation and a predominant involvement of the private sector. Togo therefore aims to structurally transform its economy towards the part of a strong, sustainable, resilient, and inclusive economy. That is, an economy that creates jobs and improves social well-being while respecting the environment.

On the agricultural front, "the government is convinced that it is necessary to promote agricultural Oriented growth. This is, an "agribusiness sector" that can attract private investment, increase returns, professionalise the players, and create thousands of jobs and related services. This has led to the establishment of an agency for the promotion of agribusiness development in the country. Its main role is to establish public-private partnerships based on the National Agricultural Investment and Food and Nutritional Security Plan (PNIASAN) covering the period 2017-2026".

At the level of agricultural production, water management is an essential element for the promotion of agricultural production. This is why, the government has placed greater emphasis on the evaluation of surface water resources to effectively support the development of the Kara Basin agropole, in the context of increased water use for agricultural transformation.

To this end, the Agency for the promotion of agropoles in Togo (APRODAT) is responsible for the development of irrigated perimeters and lowlands that will allow water control and farming throughout the year.

However, the development of irrigated perimeters and lowlands will not be without consequences on the project's receiving environment. It was therefore decided to draw up an environmental and social impact assessment study (ESIA). The general context, the legal and institutional framework and the description and analysis of the initial state of the project area are presented in volume 1 entitled: *"CONTEXT, STUDY METHODOLOGY, POLITICAL, LEGAL, NORMATIVE AND INSTITUTIONAL FRAMEWORKS, DESCRIPTION OF THE RECEPTIVE ENVIRONMENT AND PRESENTATION OF THE PROJECT"*.

As a reminder, of the "hydro-agricultural developments" component B, the water from the dams will essentially be used for gravity and solar powered irrigations of plains downstream for various agricultural activities (market gardening, horticultural activities, climate resilient agricultural practices etc.). Two basic rules are to be observed to delimit the areas to be irrigated:

- the land is suitable for irrigation (soil quality)
- the topography is favourable to irrigation by the surface gravity system: the maximum elevation of the areas to be irrigated must be lower than the elevation of the dam's water intake, in order to allow gravity flow of the irrigation water.

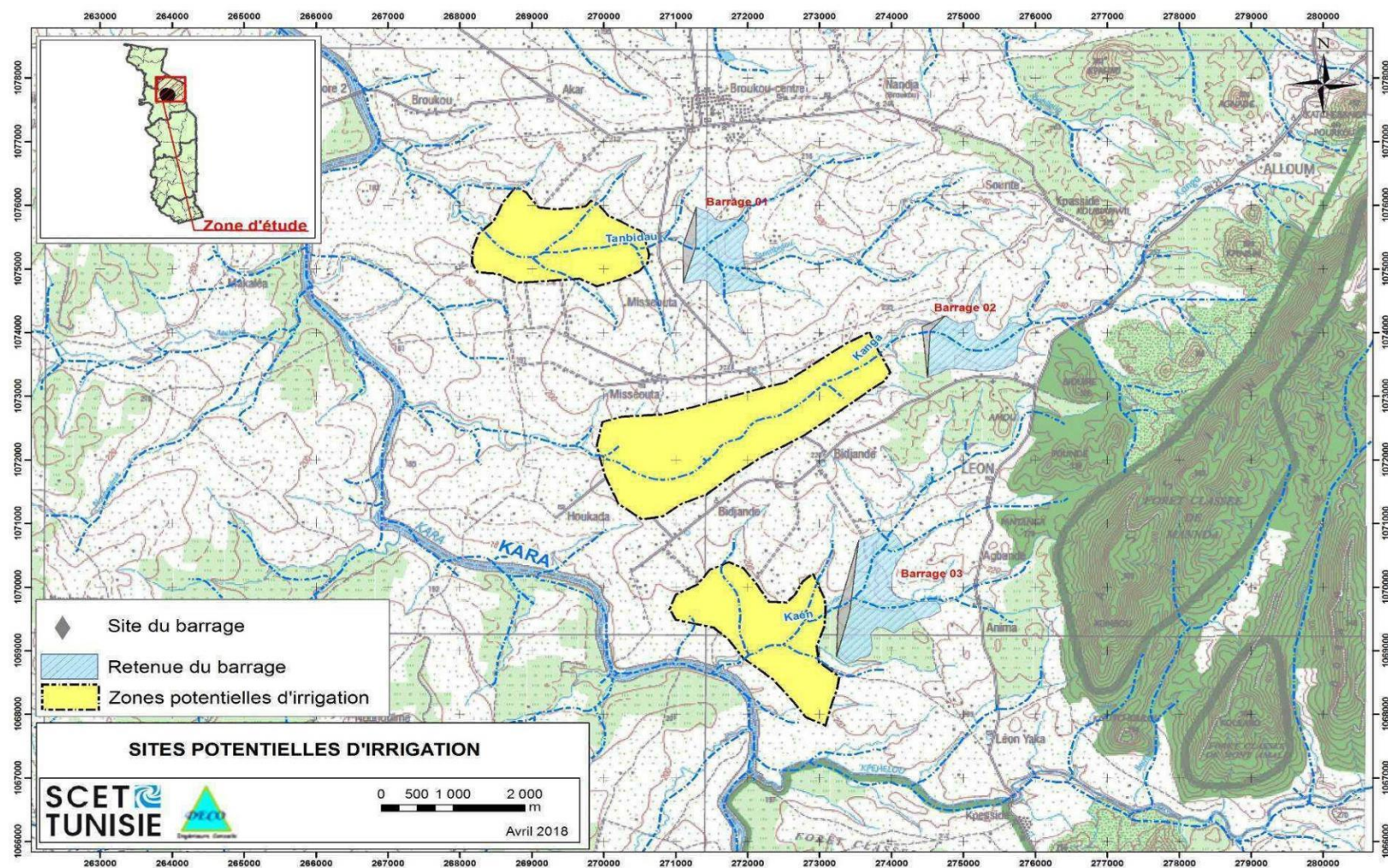
To this end, it is planned to develop nearly approximately 15,428.0 ha gross to be irrigated: This is inclusive of off-season irrigation (20% on average), i.e. nearly 3000 ha of irrigated crops per year (mainly rice, vegetables, fruits, maize, soya and various other off-season and perennial crops). The irrigation system adapted to the context of the Project and to the types of crops to be grown is surface irrigation (submersion) with a water distribution system through open canals operating on a water tower and surface catchment ponds and small reservoirs.

The development plan for each site includes the following works:

- one (or 2 if the dam feeds both banks) supply structure and load breaker, coming from the dam's water intake
- a channel, on each bank, trapezoidal in shape, semi-buried, made of concrete-lined earth in order to limit water loss in the transfer. This canal will be dimensioned for peak irrigation flow (both gravity and solar powered). It will be built using cut-and-fill (targeted cut-and-fill balance, avoiding the need to transport external materials to build the canal). It will roughly follow the contour line corresponding to the level of the dam intake and will have a minimum slope of about 0.5‰. The right-of-way of this structure is a few metres. It will be bordered by a right-of-way (a roughly laid-out track). If necessary, cattle drinking troughs can also be built along the canals.
- In the case of gravity-fed irrigation, when it reaches the level of the plain or lowland to be irrigated, the main canal feeds a network of gravity-fed secondary canals, also made of concrete-lined earth. For solar powered, it will be channeled into a small catchment ponds and reservoirs that will be constructed for same irrigational purposes. These secondary canals are generally laid out in a transverse direction. They feed tertiary canals made of earth, installed in the longitudinal direction (schematically parallel to the watercourse) with a slight slope. Each tertiary canal conveys a "hand of water" of 20 to 30 l/s to irrigated plots of land, the size of which is a priori 1 ha: 200 m x 50 m (area considered reliable to guarantee a sufficient income for future irrigators). The hand of water circulates in turn between the plots of land in the same hydraulic district, which are about ten hectares in size (400 m x 250 m, with a central tertiary canal).
- a drainage network made up of main, secondary and tertiary drains (earth ditches generally 0.50 to 1m 1m50 deep). This network is designed to store excess runoff water (heavy rains) and water from emptying traps at harvest time, for rice cultivation. The main drainage collector joins the watercourse to discharge the drained water.
- A network of traffic lanes (main, secondary and tertiary) within the perimeter to allow easy access to all plots for the execution of agricultural works, for the supply of inputs and for the evacuation of agricultural products to marketing points.

Figure 1: presents the location of potential irrigation areas downstream of the 3 projected dams.

Figure 1: Irrigation perimeter sites to be irrigated



1- IDENTIFICATION AND EVALUATION OF THE ENVIRONMENTAL IMPACTS OF THE DEVELOPMENT OF IRRIGATION PERIMETERS AND LOWLAND AREAS

1.1. POSSIBLE INTERACTIONS BETWEEN CONSTRUCTION ACTIVITIES AND ENVIRONMENTAL COMPONENTS

The impacts of the project on the initial condition of the project area will be identified and assessed at four levels: first at the Preparatory Phase, then at the Construction Phase and the Operation Phase and finally at the Project Completion Phase.

1.1.1. COMPONENTS LIKELY TO BE AFFECTED BY THE DEVELOPMENT ACTIVITIES OF IRRIGATED PERIMETERS AND LOWLAND AREAS

The potential impacts of the project could affect the biophysical and human environment, including soils, water, air, fauna and flora, socio-economic conditions, health and safety, and landscape structures as shown in Table 1.

Table 1: List of environments likely to be affected

Biophysical environment	Soil	Shape of the relief
		Nature of the rocks (Soil structure)
		Soil stability (texture)
		Floor space requirement
		Chemical composition of the soil
	Water	Surface water (runoff and streams)
		Ground water
		Water quality
		Infiltration
	Air	Hydrodynamic speed
		Air quality and odour
	Flora and fauna	Noise and vibration
		Plant species
		Animal species
Human Environment	Social, cultural and economic framework	Ecosystems and biodiversity
		Demography, displacement and migration
		Customs, tradition and social relations
		Quality of life /Health/Hygiene/Safety
	Land use and landscape structure	Economic activities
		Foncier
		Habitat
		Agricultural area
		Pastoral and fishing area
		Vegetative space
		Composition of the field of view

1.1.2. ACTIVITIES THAT ARE SOURCES OF IMPACT OF THE DEVELOPMENT OF IRRIGATED PERIMETERS AND LOWLANDS

The sources of potential impacts are defined as all the activities planned during periods of site preparation, work, site setback, operation and periodic maintenance of equipment and during annual brush clearing activities.

All activities carried out during the preparatory phase, the works phase and during the operation of the project will have impacts on the environment of the project area. The different phases of the works and their impact-causing activities are shown in Table 2.

Table 2: Project activities in the preparatory, construction, operation and completion phases of the project

Phases	Activities
Preparatory phase of the project	Installation of the building site
	Bringing in construction machinery
	Layout and staking
	Clearing (brush clearing) and sub-soiling
Project construction phase	Construction of water supply canals in the perimeters to be irrigated and in the lowlands
	Construction of the irrigation system consisting of primary, secondary and tertiary canals.
	Construction of the drainage system consisting of rainwater drainage channels as well as the emptying of the plots
	Construction of a network of access tracks, services and facilities operation
	Zone planning
	Labour
	Construction of the master dikes for separation on the periphery of the plots of land
	Watering of the plots
Project Operation Phase	Construction of embankments and lowland development
	Irrigation of the plots
	Use of inputs
	Labour
	Harvesting, hulling and storage
	Sale of products
	Routine maintenance (small interventions)
End of project phase	Periodic interviews (major interventions)
	Assignment
	Dismantling
	Abandonment

1.1.3. ELABORATION OF THE MATRIX OF POTENTIAL INTERACTIONS BETWEEN THE PROJECT ACTIVITIES AND THE AFFECTED COMPONENTS OF THE ENVIRONMENT

The elaboration of the matrix of potential interaction types makes it possible to visualise the different relationships between impact sources and receptors in the preparatory, construction and operation phases. The sources of impact are the different activities of the planned works. As for the receptors, these are the components of the environment that are to be disturbed in relation to the initial state of the project area. Table 3 gives an idea of the various interactions that may exist between the sources and receptors of impact during the preparatory and construction phases of the project, the operation phase and the project completion phase.

Table 3: Matrix of Potential Interactions between Construction Activities and Environmental Components

				PREPARATORY PHASE			CONSTRUCTION PHASE											EXPLOITATION PHASE						END OF PROJECT PHASE		
	Legend		PROJECT ACTIVITIES	Installation of the building site	Bringing in construction materials	Layout, staking and parcel topographic surveys	Construction of an inlet canal	Construction of the drainage system consisting of rainwater drainage channels as well as the construction of a network of access roads, services and facilities	Construction of protective dykes	Clearing (clearing), subsiding, levelling of rice plots and	Construction of a sewerage and rainwater drainage network as well as the construction of the master dikes for separation on the basis of the plots	Watering of the plots	Construction of embankments and lowland development	Construction of fish traps	Irrigation of the plots	Use of inputs	Labour	Harvesting, hulling and storage	Routine maintenance (small interventions)	Periodic interviews (major interventions)	Folding of all work equipment and tools including all scrap	Dismantling of all surface equipment	Restoration of normal river water flow			
	-	Impact																						negatives		
	+	Impacts																						positive effects		
	-/+	Impacts																						negative and positive		
ENVIRONMENTAL COMPONENTS				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	U	V	W	
BIOPHYSICAL ENVIRONMENT	Hydrology	Ground water	1				-	-	-	-	-	-	-	-	-		-	-/+	-/+	-/+	-/+	-	-			
		Water quality	2	-			-	-	-	-	-	-	-	-	-		-	+	-	-	-	-	-			
		Hydrodynamic speed	3				-	-	-	-	-	-	-	-	-		-/+	-/+	-/+	-/+	-/+	-	-			
		Runoff (surface water)	4				-/+	-/+	-	-	-	-	-	-	-		-/+	-/+	-/+	-/+	-	-	-	-/+		
		Infiltration	5	-					-	-	-	-	-	-	-		-/+	-	-		-	-	-			
	Relief, Soil and Geology	Shape of the relief	6	-			-	-	-	-	-	-	-	-	-						-	-	-			
		Floor structure and texture	7	-			-	-	-	-	-	-	-	-	-						-	-	-	-		
		Floor space requirement	8	-			-	-	-	-	-	-	-	-	-						-	-	-			
		Soil pollution	9	-			-	-	-	-	-	-	-	-	-						-	-	-			
	Biology	Wildlife	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-/+			-	-	-	+		
		Flore	11	-		-	-	-	-	-	-	-	-	-	-	-	-/+			-	-	-	-	+		
		Ecosystem	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-/+			-	-	-	+		
	Climate and ambient air	Air quality and odour	13	-			-	-	-	-	-	-	-	-	-	-	-				-	-	-			
		Noise / Vibration	14	-			-	-	-	-	-	-	-	-	-	-					-	-	-			
HUMAN ENVIRONMENT	Socio-economic framework	Demographics / Displacement / Migration	15	+				+	+	+	+	+	+	+	+	+	+	+			-	+	+	+		
		Customs/Tradition/Social relations	16	+	-	-	-	-/+	-/+	-/+	-/+	-/+	-/+	-/+	-/+	-/+	-/+	-/+			-/+	-/+	-/+	-/+	-/+	
		Quality of life/Health/Safety/Security	17	-	-	-	-	-	-	-	-	-	-	-	-	-	+				-	-	-	-		
		Economic activities	18	-/+				-/+	+	+	+	+	+	+	+		-/+		-/+		+	+	+			
	Use of the solet landscape	Foncier	19			-/+	-/+	-/+	-/+	-/+	-/+	-/+	-/+	-/+	-/+		-/+		-/+							
		Habitat	20			-	-										-/+		-/+		+					
		Agricultural area	21			-	-		-	-	-	-	-	-	-		-/+			-/+	-	-	-			
		Pastoral and fishing area	22			-	-		-	-	-	-	-	-	-		-/+				+	-	-			
		Vegetative space	23	-		-	-		-	-	-	-	-	-	-		+				-	-	-			
Composition of the field of view	24														-											

1.2. DESCRIPTION AND ANALYSIS OF IMPACTS

1.2.1. DESCRIPTION AND ANALYSIS OF THE IMPACTS IN THE PREPARATORY PHASE

1.2.1.1. Description and evaluation of impacts on the biophysical environment

1.2.1.1.1. Negative impacts

A) Loss of vegetation

The work to install the site, lay out and stake out the land, carry out topographical surveys of the plots, and clear the sites (clearing brush) for the development of the irrigated perimeters and the shallows will destroy the vegetation currently on the site. Direct physical damage to the vegetation in the irrigation perimeters and the lowlands will involve a mosaic of shrubby savannah, small forest galleries along watercourses, fallow land where woody species only grow as shrubs, and agroforestry. Among the species to be destroyed are trees of economic value of about 562 individuals presented in Table 4.

Table 4: Anthropogenic plant species on the sites of the perimeters to be irrigated

Plant species	Scientific name	Family	Sites			Total
			Perimeter of the mini Broukou dam	Perimeter of the mini Kpassidè dam	Perimeter of the mini Léon dam	
Kapokier	<i>Ceiba pentandra</i>	Bombacaceae	4	6	15	25
Terminalia	<i>Terminalia sp.</i>	Combretaceae	169	24	4	197
Néré	<i>Parkia biglobosa</i>	Mimosaceae	16	6	8	30
Karité	<i>Vitellaria paradoxa</i>	Sapotaceae	69	15	14	98
Mango tree	<i>Mangifera indica</i>	Anacardiaceae	7	4	9	20
Oil palm	<i>Elaeis guineensis</i>	Arecaceae	35	6	12	53
Teak	<i>Tectona grandis</i>		100	5	15	120
Rônier	<i>Borassus aethiopum</i>	Arecaceae	9	5	5	19
Total			409	71	82	562

Source: Fieldwork SCET Tunisia/DECO IC/2018

In addition to these species of economic value, the works for the development of irrigated perimeters and lowlands will also affect species that are threatened with extinction due to their preferential and abusive use by local populations as charcoal, firewood or timber. These are *Pterocarpus erinaceus*, *Anogeissus leiocarpus*, *Prosopis africana*, *Terminalia spp*, *Khaya senegalensis* which are all found in the field inventory.

In addition, the work will also affect other species that are on the IUCN Red List of Plant Species Conservation Status Inventory presented in Table 5, which can be found on the sites of the perimeters to be irrigated. These are : *Azalia africana*, *Vitellaria paradoxa*, *Diospyros mespiliformis*, *Pterocarpus erinaceus*, *Anogeissus leiocarpus*, *Terminalia spp*, *Khaya senegalensis*.

Table 5: IUCN Red List of Plant Species Conservation Status Inventory

Species	Family	IUCN Categories
<i>Afzelia africana</i> Sm.	Fabaceae	VU
<i>Vitellaria paradoxa</i>	Sapotaceae	VU
<i>Diospyros mespiliformis</i>	Ebenaceae	NA
<i>Khaya senegalensis</i>	Meliaceae	EN
<i>Pterocarpus erinaceus</i>	Fabaceae	LR
<i>Anogeissus leiocarpus</i>	Fabaceae	NA
<i>Prosopis africana</i>	Mimosaceae	LR
<i>Terminalia spp</i>	Combretaceae	NA
<i>Adansonia digitata</i>	Bombacaceae	NA

The different IUCN plant categories are defined as follows: EN: Endangered Species; VU: Vulnerable; LR: Low Risk and NA: Not applicable.

The works will also have a direct destructive impact on the vegetation in terms of loss of plant species and biomass when the borrowed areas are cleared for the exploitation of lateritic gravel that will be used to build tracks at the level of the perimeters to be irrigated.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Strong	Major	Strong	Strong	Small and Medium

The absolute importance of the impact is major and its relative importance strong. It requires specific mitigation measures. The impact is irreversible.

B) Reduction of medicinal plants

Clearing (clearing) for the development of irrigated perimeters and lowlands will lead to the reduction of medicinal plants.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Punctual	Low	Minor	Strong	Average	Small and Medium

The absolute importance of the impact is minor and its relative importance average because of the value of the affected component.

However, the consultant conducted an Ethno-botanical survey among the populations in order to know the plant species used for phyto-therapeutic treatments. The results of this survey show that the populations will not lose anything in terms of medicinal recipes, as none of the species cited is specific to the area of the perimeters to be irrigated, either in the gallery forest or on the mainland. They are : *Afzelia africana*, *Lannea kerstingii*, *Lannea acida*, *Annona senegalensis*, *Parkia biglobosa*, *Khaya senegalensis*, *Nauclea latifolia*, *Adansonia digitate*, *Vitellaria paradoxa*.

C) Loss of wildlife

The clearing (clearing of brush), subsoiling, levelling of areas and ploughing will disturb the fauna currently living there, particularly murids, aquatic fauna and microfauna in the soil. In fact, direct physical damage to the vegetation in the right-of-way of the worksite will disturb the fauna frequenting the sites and its surroundings by the presence of machinery and the noise generated by the worksite. Small mammals and birds will be displaced to other surrounding areas.

For the fauna, the project will result in the loss of the various habitats mentioned above and more particularly in the loss of shelter, nesting and feeding sites. In addition to the loss of habitat, the clearing of sites will lead to the destruction of broods. Animals will then flee or even die on the sites. Wildlife will also be hunted by workers on the sites.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Low	Average	Small and Medium

The absolute importance of the impact and its relative importance are medium. It requires specific mitigation measures. The impact is reversible.

D) Solid waste on the ground

The clean-up activities will generate green solid waste from the destruction of vegetation that will clog up the soil.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Punctual	Average	Average	Low	Average	Certain and Strong

The absolute importance of impact and its relative importance are medium. It requires special mitigation measures. This impact is irreversible.

E) Soil pollution by green solid waste

The clean-up activities will generate green solid waste from the destruction of vegetation as well as the products of excavated material that will pollute the soil.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Punctual	Low	Minor	Low	Low	Certain and Strong

The absolute importance of the minor impact and its low relative importance. It does not require any particular mitigation measures. This impact is reversible.

F) Degradation of the soil structure

Subsoiling work will degrade the texture of the deeply disturbed soil. Excavation could lead, in some places, to the breakage of the soil structure at the level of the work right-of-way. Indeed, the clearing of vegetation before excavation already exposes the soil to erosion, which will increase its vulnerability to leaching and erosion.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Local	Average	Average	Average	Average	Small and Medium

The absolute and relative magnitudes of the impact are average. It requires specific mitigation measures. However, this impact is reversible.

G) Air pollution

During subsoil clearing (brush clearing) work, exhaust gas emissions (nitrogen oxides, carbon oxides, sulphur dioxide, etc.) as well as the dust released during this work will be the source of air pollution.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Local	Average	Average	Average	Average	Small and Medium

The absolute and relative magnitudes of the impact are average. It requires specific mitigation measures. However, it is reversible.

H) Surface water pollution

Clearing (brush clearing) will result in the pollution of the surface water of the various watercourses from the green solid waste from tree felling. During sub-soiling, levelling and ploughing operations, topsoil may also end up in river beds and increase their turbidity.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Punctual	Low	Minor	Average	Average	Small and Medium

The absolute importance of the impact is minor. On the other hand, its relative importance is medium because of the value of the affected component and requires special mitigation measures. It is, however, reversible.

I) Increase in the noise level in the noise environment of the sites

The transport of materials and equipment to the work sites by vehicles, as well as the operation of machinery during clearing (clearing of brush), sub-soiling, levelling of areas and ploughing, will result in a rise in the noise level of the environment that existed on the sites before the start of the work.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Punctual	Average	Minor	Average	Average	Small and Medium

The absolute importance of the impact is minor. Its relative importance is medium because of the value of the affected component. It requires special mitigation measures. However, it is reversible.

1.2.1.1.2. Positive impacts

In the preparatory phase, no positive impact was identified on the biophysical aspects of the sites of the perimeters to be irrigated.

1.2.1.2. Description and evaluation of impacts on the human environment

1.2.1.2.1. Negative impacts

A) Damage to cultural and religious property

On the sites of the perimeters to be irrigated there is a sacred forest consisting of a forest gallery in Misséouta. Indeed, according to the testimonies of the populations of the M'bli district in the locality of Misseouta still, a relic of sacred wood is present in the right of way of the development planned from the mini-dam of Kpassidè (B2) on the river *Kanga*. It is a forest gallery where a fetish leopard existed.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Strong	Strong	Small and Medium

The absolute importance of the impact is medium and its relative importance is high because of the value of the affected component. It requires special mitigation measures. The impact is irreversible.

B) Temporary loss of crop year and cultures

At the time of the clearing (clearing of brush), subsoiling, levelling of areas and ploughing for the development of the perimeters to be irrigated, agricultural activities will stop for a while; this will lead to a loss of the agricultural season. This cessation of activity will cause the farmers of the affected plots to temporarily lose the crops of one agricultural season. A total of 193 people are affected: 73 on the perimeter to be irrigated from the Broukou dam (B1) on the *Tambidau* river, 120 on the perimeter to be irrigated from the Kpassidè dam (B2) on the *Kanga* river (27 on the bank of Misséouta (right bank) and 93 on the bank of Bidjandè (left bank). Tables 6 to 8 present the list of farmers whose plots will be affected when the perimeters to be irrigated from the Broukou (B1), Kpassidè (B2) and Léon (B3) dams are developed.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Strong	Strong	Small and Medium

The absolute importance of the impact is medium and its relative importance is high because of the value of the affected component. It requires special mitigation measures. The impact is irreversible.

Table 6: List of farmers on the site of the perimeter to be irrigated from the Broukou dam (B1)

N°	Surname and First Names	Area	Speculations	Area by speculation
1	TIENDOU N'diki	2	Corn	0,5
			Sorghum	1
			Yam	0,25
2	PA	1	Sorghum	1
3	Mrs PONTE Tossou	3	Corn	1
			Sorghum	1,5
			Soy	0,5
			Rice	0,25
4	BAFAÏ Mousourou	3,5	Cotton	1
			Corn	1,5
			Peanut	1
5	BAFAI Kataholo	2	Corn	0,5
			Soy	1
			Sorghum	0,5
6	KATAKA AMA	1,5	Maize	0,5
			Sorghum	0,75
			Rice	0,25

PA: Affected person absent at time of identification

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7	KPEKOU Soto	4	Maize	1,5
			Cotton	1
			Sorghum	1
			Soy	0,5
8	TEKI Tchakou	2	Maize	1
			Sorghum	1
9	KOUBATINE Poulia	2	Maize	1
			Sorghum	1
10	ASMA Taba	3	Sorghum	0,75
			Soy	1
			Maize	1
11	ALI Blaise	4	Maize	2,5
			Cotton	0,5
			Yam	0,5
12	ASSOTOME Tchakou	2,5	Maize	1
			Cotton	1
			Sorghum	0,5
13	BATANTA Guèba	3	Maize	1
			Sorghum	1,5
			Rice	0,5
14	ASSOUTOME Kodjo	1,5	Maize	0,25
			Sorghum	0,75
			Soy	0,5
15	ASSOUTOME N'dja	2	Maize	0,5
			Sorghum	1,5
			Rice	0,75
16	TINTOME Amlé	2	Maize	0,5
			Sorghum	1,5
			Rice	0,75
17	GNOUDIKI Akpare	4	Maize	0,25
			Sorghum	2
			Yam	0,5
18	TAMA Kounanyè	2	Maize	0,5
			Sorghum	0,5
			Rice	1
19	BAYAWOUGOU Seda	2	Sorghum	2
20	PA	3	Sorghum	3
21	KABISSA M'balguaï	1,75	Maize	0,5
			Sorghum	0,75
			Rice	0,5

PA: Affected person absent at time of identification

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22	PA	1	Sorghum	1
23	GNIDIKI Kandji	3	Maize	0,5
			Sorghum	1,75
			Rice	1
24	BEKETOU Mabawena	1	Maize	0,5
			Sorghum	0,5
25	BATANTA Katassagou	3	But	1,5
			Sorghum	1,5
26	AWAKI Kesir	5	Maize	2
			Sorghum	0,5
			Soy	2
27	DABA Katchaï	3	But	1
			Sorghum	1
			Soy	1
28	YEDE Tchisso	3	Maize	1
			Cotton	1
			Sorghum	1
29	DABA Mitawè	1,5	Maize	0,5
			Sorghum	0,5
			Rice	0,5
30	BANAKOU Pitiri	2	Cotton	1,5
			Sorghum	0,5
31	DABA Sekendé	3	Maize	1
			Sorghum	1
			Peanut	1
32	KALINKO Adjo	1	Maize	0,5
			Sorghum	0,25
			Soy	0,5
33	KALINKO N'dja	2	Maize	1
			Sorghum	0,5
			Soy	0,5
34	KALINKO Koussenam	1,5	Sorghum	1,5
35	Kodjo Health	4	Maize	1
			Sorghum	1,5
			Rice	1
			Yam	0,5
36	KOLOU Boukari	2	Sorghum	0,5
			Maize	0,5
			Soy	1

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37	KOLOU N'nabia	3	Maize	1
			Sorghum	1
			Rice	1
38	ADIGOU Moudou	1,5	Sorghum	0,5
			Maize	0,5
			Soy	0,5
39	PA	2	Sorghum	2
40	PA	2	Sorghum	2
41	LOUKOUM Paba	6	Maize	2,5
			Rice	2,5
			Soy	1
42	KOLOU Kawadé	2	Sorghum	0,5
			Maize	1
			Soy	0,5
43	KADOUWA Arbia	5	Cotton	1
			Sorghum	2
			Maize	1
			Rice	1
44	PA	1	Rice	1
45	PA	1	Sorghum	1
46	ASTOM Sahé	2	Sorghum	1
			Rice	1
47	PA	1	Maize	1
48	PA	2	Sorghum	2
49	AYATEOU chef N'BLI	5	Cotton	1
			Sorghum	2
			Maize	1
			Rice	1
50	BADJANGUE Yao	3	Sorghum	1
			Maize	1
			Soy	1
51	KOUBATIM Oubré	3	Sorghum	1,75
			Maize	1
			Yam	0,25
52	PA	3	Sorghum	3
53	PA	2	Sorghum	2
54	KOLOU Kokou	4	Sorghum	2
			Maize	1
			Rice	0,5
			Yam	0,5

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55	KPANGALAM Kousokou	3	Sorghum	1
			Maize	1
			Yam	0,5
56	KOUBATIM Kadoua	3	Sorghum	1
			Maize	1
			Yam	0,5
57	KPANGALAM TEHE	2	Sorghum	1
			Maize	0,5
			Rice	0,5
58	PA	1	Maize	1
59	KOUBATIM Mignak	3	Cotton	3
60	KOUBATIM Pakai	1	Sorghum	0,75
			Maize	0,25
61	PA	1,5	Maize	1,5
62	PA	2	Sorghum	2
63	PA	2	Sorghum	2
61	SAAMRE Atsou	2,5	Cotton	1,5
			Maize	0,5
			Sorghum	0,5
62	BAYAGOU Batalé	3	Cotton	1
			Sorghum	1
			Rice	1
63	SAAMRE Komla	3	Cotton	1,5
			Maize	0,5
			Sorghum	0,5
64	Kaya Health	2,5	Cotton	1
			Maize	1
			Sorghum	0,5
65	TASTOM Ouro	1	Sorghum	0,75
			Maize	0,25
66	LIMDEWOU Ekpaï	2	Maize	1
			Sorghum	0,5
			Soy	0,5
67	WASINKOU Bataya	3	Sorghum	2
			Maize	1
68	GNIYOU Katitoma	3	Sorghum	1
			Maize	1
			Soy	1

PA: Affected person absent at time of identification

69	MANI Aklesso	2	Sorghum	1
			Maize	0,5
			Rice	0,5
70	YOUROUTAGNI Koudabalo	3	Maize	1
			Cotton	1,5
			Sorghum	0,5
			Yam	0,25
71	YOUROUTAGNI Abalo	2	Sorghum	1
			Maize	1
72	N'DJA Kossi	2	Sorghum	1
			Maize	0,5
			Cotton	0,5
73	MANI Panla	2	Sorghum	0,5
			Cotton	1,5

Source: Fieldwork SCET Tunisia/DECO IC/2018

Table 7: List of farmers on the site of the perimeter to be irrigated from the Kpassidè dam (B2)

N°	Name and Surname	Area	Speculators	Area of speculation
1	ADIME Tomdji	3,5	Maize	1,5
			Cotton	1
			Soy	1
2	AKOUKA Amina	3	Cotton	1
			Soy	1
			Maize	1
3	AHOUTE Kena	2	Sorghum	0,75
			But	0,5
			Soy	0,5
4	NITROGEN Pouelo	3,25	Maize	1,5
			Cotton	1,5
			Yam	0,25
5	NITROGEN Issifou	3	Maize	2
			Soy	0,75
			Sorghum	0,25
6	TATANGUE Bagnamé	5,5	Maize	2
			Cotton	1,5
			Sorghum	0,5
			Rice	1,5

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7	BODJONA Aklesso	3	Cotton	0,5
			Soy	1
			Sorghum	0,5
			Rice	0,5
8	MANI Panla	5	Cotton	1,5
			Peanut	0,5
			Maize	2
			Yam	0,25
			Soy	0,5
9	TAGBA Tchalna	5	Cotton	1,5
			Maize	2
			Sorghum	1
			Peanut	0,25
10	TIKANDO Nakparo	6	Maize	3
			Cotton	3,5
11	KOMTINTE Koubatine	1	Maize	0,5
			Soy	0,5
12	KELE Fatima	2	But	1
			Soy	0,5
			Sorghum	0,5
13	TIKANDO Clement	2,5	Maize	1
			Sorghum	0,5
			Soy	0,5
			Rice	0,5
14	ALETI	4	Maize	2
			Rice	0,5
			Sorghum	1
			Soy	0,5
15	KARBOO Miniki	4	Maize	1
			Rice	0,5
			Sorghum	1
			Soy	0,5
16	KARBOU Mafaïtom	4	Maize	1
			Rice	0,5
			Sorghum	1
			Soy	0,5
17	GNONSSA Pantom	2	Sorghum	2
18	AKOUKA Kossi	2,5	Maize	11
			Sorghum	1
			Soy	0,2

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19	AKOUKA KILOUKOU	5	Maize	1
			Cotton	0,5
			Soy	1
			Sorghum	0,5
20	ADIME Ognaa	4	Cotton	1,5
			Maize	2
			Soy	1
21	TALO Amadou	5	Cotton	1
			Maize	0,5
			Soy	1,5
22	AKOUKA Mustotine	4	Cotton	1
			Sorghum	0,5
			Maize	1,5
			Soy	0,75
23	IBE Mafaïtom	2,5	Soy	0,5
			Cotton	1
			Maize	1
24	IBE Anianhou	3	Soy	1
			Cotton	1
			But	1
25	TIKINDO Yao	2,5	Sorghum	1,25
			But	0,75
			Soy	0,5
26	TIKINDO Moko	3	Cotton	1,5
			But	1
			Sorghum	0,5
27	Mrs TCHOU Nana	2	Sorghum	2

Source: Fieldwork SCET Tunisia/DECO IC/2018

Table 8: List of farmers on the site of the perimeter to be irrigated from the Léon dam

N°	Surname and First Names	Area	Speculation	Area of speculation
1	PA	4	Cotton	2
			Sorghum	2
2	PA	1	Cotton, sorghum	1
3	PA	1	sorghum	1
4	PA	2	Cotton	2
5	PA	0,5	Rice	0,5
6	PA (among the Peulhs)	2	Sorghum	2
7	TABOLO Kandji	10	Sorghum	10
8	TABOLO Abridged	5	Corn	5
9	TETOU Ayibère	1	Sorghum	1
10	TETOU Adjì	1	Sorghum	1
11	TABOLO Badaba	5	Sorghum	5
12	N'DJA	1	Sorghum	1
13	AKOUKA	2	Sorghum	2
14	KPESSIA	2	Sorghum	2
15	KAWARIA	1	Sorghum	1
16	N'DJA KETE	2	Sorghum	1
			Corn	0,5
			Yam	0,5
17	N'DJA Koubia		Cotton	1
			Corn	1
			Rice	0,5
18	TOBIA Akpamak	2	Sorghum	1
			Rice	0,5
			fonio	0,5
19	TOBIA Kpanga	2	Sorghum	1
			Corn	0,5
			Yam	0,5
20	AKOU Kassewa	3	Sorghum	1
			Corn	1
			Cotton	1
21	KARI Afia	2	Sorghum	1
			Soy	1

PA: Affected person absent at time of identification

22	TOBIA Koussou	3	Sorghum	0,5
			Corn	1
			Cotton	1
			Fonio	0,5
23	TOBIA Kagnini	3	Sorghum	1
			Corn	1
			fonio	0,5
24	N'DJA Tchangai	5	Sorghum	1
			Rice	0,5
			Yam	1
25	TABIO Ako	2	Sorghum	1
			Cotton	1
			soya	0,5
26	HATOU Kagnine	4	Sorghum	2
			Rice	1
			igame	1
27	KAWARA Agbala	3	Sorghum	1
			fonio	0,5
			Corn	1
			Yam	0,5
28	TETOU Makawa	2,5	Sorghum	1
			Corn	0,5
			Cotton	1
29	ATAKONA Simon	1,5	Sorghum	0,5
			Corn	0,5
			Cotton	0,5
30	KPISSIA Yao	3	Sorghum	1
			Corn	1
			Cotton	1
31	DJAHASSI Awesso	1,5	Sorghum	0,5
			Corn	0,5
			Soy	0,5
32	ASSOTINA Miassan	3	Sorghum	0,5
			Rice	1,5
			Corn	0,5
			fonio	0,5
33	GNAMOU Kekpé	3	Sorghum	1
			fonio	0,5
			Cotton	1
			Yam	0,5

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34	GNAMOU Wenadé Note	1,5	Sorghum	0,5
			Corn	0,5
			Cotton	0,5
35	KPINDI Akoundou	2,5	Sorghum	1
			Corn	0,5
			soya	1
36	KPINDI Afia	1,5	Sorghum	0,5
			Corn	0,5
			soya	0,5
37	KAWARIA Ahounbem	2	Sorghum	0,5
			Corn	1
			Fonio	0,5
38	KASIA Pya Abalo	1,5	Sorghum	0,5
			Corn	0,5
			soya	0,5
39	KAWARIA Aklo	2	Sorghum	0,5
			Corn	1
			yam	0,5
40	DOLOU Simeabalo	2	yam	0,5
			Corn	0,5
			Cotton	1
41	TCHAWALOU Ama	1,5	Sorghum	0,5
			rice	0,5
			peanut	0,5
42	BODJONA Antoine	3	Sorghum	1
			Corn	1
			Soy	1
43	MOTA Bawa	2	Sorghum	0,5
			Corn	1
			Cotton	0,5
44	ANAKPA N'NAA	2	Sorghum	1
			Corn	0,5
			Cotton	0,5
45	AKAYA Manawa	1,5	Sorghum	0,5
			Corn	0,5
			Cotton	0,5
46	AKAYA Hodabalo	2	Sorghum	1
			Corn	0,5
			Cotton	1

PA: Affected person absent at time of identification

47	PATABATI Katossouna	3,5	Sorghum	1,5
			Corn	0,5
			Cotton	0,5
			Ignam	0,5
			Soy	0,5
48	MAGBEKOU Agoussi	3	Sorghum	1,5
			Corn	0,5
			Cotton	0,5
49	AKPEA Kalouka	2	Sorghum	1
			Corn	0,5
			Cotton	0,5
50	PILOT Kossi	3	Sorghum	1
			Corn	1
			Cotton	1
51	ASSIH Souméabalo	2	Cotton	2
52	AKAYA Patakim	2	Sorghum	1
			Corn	0,5
			Cotton	0,5
53	SIMTOKENA Amavi	1,5	Sorghum	0,5
			Corn	0,5
			Cotton	0,5
54	KAZIE Mazabalo	2	Sorghum	0,5
			Corn	0,5
			Cotton	1
55	ABALO Hodabalo	2	Sorghum	1
			Corn	0,5
			Rice	0,5
56	PA	1	Sorghum	1
57	ABALO Tchilabalo	3	Sorghum	1
			Corn	1
			Cotton	1
58	SIMTOKENA Pantom	2	Sorghum	0,75
			Corn	1
			Yam	0,25
59	SIMTOKENA Nassoukou	2,25	Sorghum	1
			Corn	0,25
			Cotton	1
60	KPABI Koffino	2	Sorghum	1
			Soy	1

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61	SIMTOKENA Abotchi	3	Sorghum	1
			Corn	1
			Cotton	1
62	SIMTOKENA Pahar	1	Sorghum	0,5
			Corn	0,25
			Cotton	0,25
63	SIMTOKENA N'patinam	1	Sorghum	1
64	WENALE Yélé	2	Sorghum	2
65	ABALO Ablavi	3	Corn	0,5
			Cotton	1
			Sorghum	0,75
			Soy	0,5
66	TITERINTA HOYEM	2	Cotton	1
			Sorghum	0,5
			Corn	0,5
67	TCHANDE Para	3	Cotton	3
68	NASSOUROU Komlan	1	Cotton	1
69	TCHANDE Tchamba	3	Corn	1
			Cotton	1
			Sorghum	1
70	TCHANDE Tabolo	2	Corn	0,5
			Cotton	0,5
			Sorghum	1
71	KOUNDOU Likiti	2,5	Corn	1
			Cotton	1
			Soy	0,5
72	KOUNDOU Yaovi	3	Cotton	2
			Sorgo	1
73	KATAO Pakoutoukou	2,5	Sorghum	0,5
			Corn	0,5
			Cotton	1
74	N'DJIDABA N'fétéga	2	Sorghum	1
			Corn	0,5
			Cotton	0,5
75	BODJONA Yaovi	2	Sorghum	0,5
			Corn	1
			Cotton	0,5
76	TCHAMDJE Kougnoutimba	2	Sorghum	2

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77	TCHANGUE Sounkouwa	3	Sorghum	1
			Corn	0,5
			Cotton	0,5
			Soy	1
78	TITERINTA Maklissim	2	Corn	0,5
			Sorghum	0,5
			Soy	1
79	KOUNDOU Mandame	2	Corn	1
			Cotton	0,5
			Sorghum	0,5
80	AGOUSSI Mabissi	2,5	Sorghum	1
			Corn	0,5
			Cotton	1
81	AGOUSSI Afia	2	Sorghum	0,5
			Corn	0,5
			Cotton	1
82	TITA Aflan	2	Sorghum	0,25
			Corn	1
			Cotton	0,5
83	MOKRE Bankoum	1	Corn	1
84	TABPLO Absolute	1,5	Sorghum	0,5
			Corn	0,5
			Cotton	0,5
85	AKOUKA Komlan	1	Sorghum	1
86	TABOLO Badaba	2	Sorghum	1
			Corn	0,5
			Cotton	0,5
87	POSKE Kpatcha	2,75	Sorghum	1
			Corn	1
			Cotton	0,5
			Rice	0,25
88	ANAKPA Eyawelé	2,5	Sorghum	0,5
			Corn	0,5
			Cotton	1
89	KAZIE Palakiem	3	Sorghum	1
			Corn	1
			Cotton	1
90	KAZIE Samuel Abalo	2	Sorghum	1,5
			Corn	0,5

91	SEOU Chechnya	2,5	Sorghum	0,5
			Corn	1
			Cotton	1
92	SEOU Atanimi	3	Sorghum	0,5
			Corn	1
			Cotton	1,5
93	ANAKPA Pyabalo	5	Sorghum	0,5
			Soy	1
			Corn	2
			rice	0,5
			yam	0,5

Source: Fieldwork SCET Tunisia/DECO IC/2018

C) Respiratory nuisance at the level of the employees of the construction company

Workers on the site, especially workers, will be exposed to air pollution generated by vehicles and machinery operating on the site during clearing (brush clearing) and subsoiling.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Average	Punctual	Average	Average	Strong	Strong	Small and Medium

The absolute importance of the impact is medium and its relative importance is high because of the value of the affected component. It requires special mitigation measures. The impact is reversible.

D) Noise pollution at the level of the employees of the works company

Workers on the site, especially workers, will be exposed to noise generated by vehicles and machinery operating on the site during clearing (clearing brush) and subsoiling.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Average	Punctual	Average	Average	Strong	Strong	Small and Medium

The absolute importance of the impact is medium and its relative importance is high because of the value of the affected component. It requires special mitigation measures. The impact is reversible.

1.2.1.2.2. Positive impacts

A) Creation of temporary jobs and income

The clearing work (brush clearing) and subsoiling in the preparatory phase will create temporary jobs for the benefit of some young people in the project area. The types of jobs that will be offered to the population include, among others, guarding of the installations, labourers' and skilled workers' positions if the localities have them.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Average	Punctual	Average	Average	Small and Medium	Reversible

B) Stimulation of the local and national economy

Wages will be paid directly to the workers and thus returned to the national economy in the form of consumption, taxes and savings. These employment opportunities will strengthen the purchasing power of these young people and help promote the local economy through the emergence of small income-generating activities near the development sites of the areas to be irrigated. All these jobs will provide income and improve the living conditions of the people concerned.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Indirect	Average	Punctual	Average	Average	Small and Medium	Reversible

C) Stimulation of commercial and income-generating activities

During the works, small-scale commercial activities, including catering and the sale of food and basic necessities, will be stimulated by the presence of company staff and also of local labour who will be recruited locally and will have an income. This aspect of the impact is therefore positive and reversible.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Average	Punctual	Low	Minor	Small and Medium	Reversible

D) Creation of social links

The presence of foreign site workers, other than local workers, will encourage a cultural mix. This mixing will manifest itself through positive externalities such as diversity of thought, understanding and action in the face of problems that strengthen the development of the populations. The workers on the sites will maintain cultural exchanges with the villages on the project sites during the duration of the work. The maintenance of a project staff base in the area, shuttle buses through the localities, and the use of goods offered by petty trade, will give rise to relationships ranging from mutual acquaintances to various forms of friendship. This will have a positive social impact. It is irreversible.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Average	Local	Low	Average	Certain and Low	Reversible

1.2.2. DESCRIPTION AND ANALYSIS OF THE IMPACTS OF CONSTRUCTION

1.2.2.1. Description and evaluation of impacts on the biophysical environment

1.2.2.1.1. Negative impacts

A) Degradation of the soil structure

Excavation and excavation work for the construction of the water supply canals, the irrigation system and the drainage system will degrade the soil structure in the excavated areas.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Local	Average	Average	Average	Average	Small and Medium

The importance of the impact is medium. The absolute magnitude of the impact and its relative importance are medium and require special mitigation measures. However, this impact is reversible.

B) Soil pollution by solid waste

The work to develop the areas to be irrigated and the operation of the business base during the construction phase will generate various types of waste that will pollute the soil. These are :

- Common Industrial Waste (CIW), which is non-inert and non-hazardous waste generated by activities, in particular plastic bags, empty cement bags, etc.
- Inert Waste (IL), which is waste that does not undergo any significant physical, chemical or biological modification in the event of storage and does not present a danger to humans or the environment. This includes: slash from felled trees, excavated material, the remains of sand and gravel used for the construction of the main canals and other structures, etc.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Average	Punctual	Average	Average	Low	Average	Small and Medium

The absolute importance of impact and its relative importance are medium. It requires special mitigation measures. This impact is reversible.

C) Increase in air pollution

During the construction phase, the number of vehicles and machinery on the site will increase, leading to increased pollution from exhaust gas emissions (nitrogen oxides, carbon oxides, sulphur dioxide, etc.) as well as the release of dust that had already begun during the cleaning work in the preparatory phase.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Local	Average	Average	Average	Average	Small and Medium

The absolute significance of the impact and its relative importance are medium and require special mitigation measures. However, this impact is reversible.

D) Surface and ground water pollution

During the works, the impact on water quality will be negative. Indeed, surface water is the receptacle for solid waste from the worksites, in particular site cleaning products. plant debris, rubble, etc.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct/indirect	Short	Local	Average	Average	Average	Average	Small and Medium

The absolute importance of the impact and its relative importance are medium. It requires specific mitigation measures. However, this impact is reversible.

E) Surface water depletion

The work on the various sites for the development of the perimeters to be irrigated will lead to water consumption which can lead to a reduction in surface water, especially when the work takes place during the dry season.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Punctual	Low	Minor	Average	Average	Small and Medium

The absolute importance of the impact is minor. On the other hand, its relative importance is medium because of the value of the affected component. It requires special mitigation measures. However, it is reversible.

F) Increase in the noise level in the noise environment of the sites

The increase in the number of vehicles and site machinery as well as the use of site tools will lead to an increase in the noise level of the noise environment on the development sites of the perimeters to be irrigated.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Punctual	Average	Minor	Average	Average	Small and Medium

The absolute importance of the impact is minor. On the other hand, its relative importance is medium because of the value of the affected component. It requires special mitigation measures and is, however, reversible.

1.2.2.1.2. Positive Impacts

No positive impact was identified on the biophysical environment during the construction phase.

1.2.2.2. Description and evaluation of impacts on the human environment

1.2.2.2.1. Negative impacts

A) Respiratory Nuisance at employee level of the company's work related to air pollution

Workers on the site, especially those on the job, will be exposed to air pollution due to dust and gas emissions from vehicles transporting materials to perimeter development sites and from flattening and plowing work. They will suffer respiratory pollution during the work.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Average	Punctual	Average	Average	Strong	Strong	Small and Medium

The absolute importance of the impact is medium. On the other hand, its relative importance is high because of the value of the affected component. It requires special mitigation measures. This impact is reversible.

B) Respiratory nuisances at the population level related to air pollution

The inhabitants of the localities crossed by the construction site vehicles and those located near the construction sites will be exposed to air pollution due to the emission of dust and gas by the vehicles that will transport the materials to the perimeter development sites and the levelling and ploughing work. They will suffer from respiratory pollution during the work.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Average	Punctual	Average	Average	Strong	Strong	Small and Medium

The absolute importance of the impact is medium. On the other hand, its relative importance is high because of the value of the affected component. It requires special mitigation measures. This impact is reversible

C) Noise pollution at the level of the company workers

Workers on the site, particularly workers will be exposed to noise generated by vehicles and machinery operating on the site during levelling and ploughing work and will be subject to noise nuisance at the time of the work.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Average	Punctual	Average	Average	Strong	Strong	Small and Medium

The absolute importance of the impact is medium. On the other hand, its relative importance is high because of the value of the affected component. It requires special mitigation measures. This impact is reversible

1.2.2.2.2. Positive impacts

A) Accelerating the recruitment of labour for the work

During the construction phase, job creation through recruiting the workforce will accelerate as work increases. This will still involve the creation of temporary jobs for the benefit of a few young people in the project area. The types of jobs that will be offered to the population are, among others, guarding of the installations, labourers' and skilled workers' positions if the localities have them.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Average	Punctual	Average	Average	Small and Medium	Reversible

B) Stimulation of the local and national economy

As in the preparatory phase, the stimulus to the local and national economy will continue and even accelerate as the recruitment of the workforce continues. Wages will be paid directly to the workers and thus returned to the national economy in the form of consumption, taxes and savings. These employment opportunities will strengthen the purchasing power of these young people and help to promote the local economy through the emergence of small income-generating activities near the sites where the works are installed. All these jobs will provide income and improve the living conditions of the people concerned.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Indirect	Average	Punctual	Average	Average	Small and Medium	Reversible

C) Stimulation of commercial and income-generating activities

As the works are in their cruising phase with more labour on the sites, small commercial activities, particularly the catering and sale of food and basic necessities, will be increasingly stimulated by the presence of company personnel and also of the growing local labour force that will be recruited locally and will have an income. This aspect of the impact is therefore positive but reversible.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Average	Punctual	Low	Minor	Small and Medium	Reversible

D) Creation of social links

As in the preparatory and construction phases, the presence of foreign site personnel, other than local workers, will encourage a cultural mix. This mixing will manifest itself through positive externalities such as diversity of thought, understanding and action in the face of problems that strengthen the development of the populations. The workers on the sites will maintain cultural exchanges with the villages on the project sites during the duration of the work. The maintenance of a project staff base in the area, shuttle buses through the localities, and the use of goods offered by petty trade, will give rise to relationships ranging from mutual acquaintances to various forms of friendship. This will have a positive social impact. It is irreversible.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Average	Local	Low	Average	Certain and Low	Reversible

1.2.3. DESCRIPTION AND EVALUATION OF IMPACTS AT EXPLOITATION PHASE

1.2.3.1. Description and evaluation of impacts on the biophysical environment

1.2.3.1.1. Negative impacts

A) Modification of soil structure

The soil structure will be modified by immersion, which will cause a "melting" of the aggregates and a settling of the superficial horizons, which, even after drainage, will reduce soil aeration and the penetration of plant roots (in the case of dry off-season crops).

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Local	Average	Average	Average	Average	Small and Medium

The absolute and relative importance of the impact is average. It requires specific mitigation measures. This impact is reversible.

B) Salinisation, alkalinisation and alkalisation of soils

Three phenomena can occur as a result of irrigation with water that is too high in salts:

- salinisation, which corresponds to an increase in the content of soluble salts in the soil solution;
- Alkalization (or sodisation), which corresponds to an increase in the fixation of Na⁺ ions on the adsorbent complex in the soil;
- alkalization, which corresponds to an increase in the pH of the soil.

Alkalization can lead to the blocking of certain micro-nutrients (zinc for example), which can result in signs of deficiencies in crops, and can also reduce the effectiveness of certain nitrogen and phosphate fertilizers. In addition, highly alkaline conditions can favour the solubilisation and dispersion of soil organic matter.

Alkalization and alkalinization are usually linked. The salts come from the underground water table, which rises and becomes submerged after repeated irrigation. The first symptoms appear in the form of salt efflorescence: white or black spots, formed by the accumulation and crystallisation of salts on the surface (sodium, calcium or magnesium carbonate or sulphate). These symptoms, which only affect a very small part of the rice-growing area, are especially frequent on sandy soils, apparently due to the fact that these soils occupy high positions that are rarely submerged, where the phenomena of capillary rise of the water table and evaporation at the surface can alternate, gradually increasing the salt content until saturation. Zinc deficiencies may also appear in certain soils, causing the rice to stunt.

With the permanent use of agrochemicals (pesticides and fertilisers), the soils of irrigated perimeters and lowlands will eventually become soiled. Moreover, certain agricultural practices, notably insufficient drainage and poor or non-maintenance of the network, will more quickly encourage salinisation/alkalinisation phenomena.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Local	Average	Average	Average	Average	Small and Medium

The absolute and relative importance of the impact is average. It requires specific mitigation measures. This impact is reversible.

C) Degradation of soil physico-chemical parameters

The degradation of the physico-chemical parameters of the soil will be caused by the phenomena of salinisation and alkalisation.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Indirect	Long	Local	Average	Average	Average	Average	Small and Medium

The importance of absolute and relative impact are average. It requires special mitigation measures. This impact is irreversible.

D) Soil pollution by solid plant waste

During the exploitation phase the soil will be polluted by the residues of rice and other crops. Indeed, when the rice is harvested and after threshing the ears, the stems that are unusable by farmers will be left on the irrigated perimeters or in places where the rice has been threshed.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Average	Average	Small and Medium

The absolute and relative magnitudes of the impact are average. It requires specific mitigation measures. This impact is irreversible.

E) Loss of terrestrial vegetation

Once the irrigated perimeters and shallows have been watered, the firm term vegetation that used to occupy the sites will disappear completely. In addition, in order to maintain their plots and the irrigation and drainage networks, farmers will frequently pull out all the weeds that grow there. The farm vegetation will be replaced by aquatic vegetation.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Average	Average	Small and Medium

The absolute and relative magnitudes of the impact are average. It requires specific mitigation measures. This impact is irreversible.

F) Loss of terrestrial wildlife

The fauna, particularly small mammals made up of murids, reptiles and non-aquatic microfauna that may have escaped will be destroyed by the watering of the irrigated perimeters.

In addition, farmers in the context of crop protection will use pest and weed control methods (chemical, mechanical and biological control) in the perimeters that will contribute to the destruction of wildlife.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Average	Average	Small and Medium

The absolute importance of the impact is minor. On the other hand, its relative importance is medium because of the value of the affected component and requires special mitigation measures. It is, however, reversible.

G) Loss of birdlife

At the exploitation phase of the irrigated perimeters, the avifauna will fall victim to daily hunting because of the very significant damage to the rainfed cereal crops and rice traps. At the rice maturation phase, which lasts three (03) months, it is the granivorous birds such as the weaver, in particular.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Low	Minor	Minor	Low	Small and Medium

The absolute significance of the impact is minor and its relative importance is small. However, it is reversible and does not require any particular mitigation measures.

H) Mosquito proliferation

The presence of water permanently in the irrigated perimeters, added to the stagnant water bodies of the mini-dams, will favour the multiplication of vectors (Anopheles) and other vectors, notably, mosquitoes of the genus Culex (*Culex pipiens*, etc.), vectors of filariasis, mosquitoes of the genus Aedes, vectors of dengue and yellow fever. However, the development of Culicidian pressure is not expected to have a significant impact on the intensity of malaria, as its prevalence is already high.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Average	Average	Small and Medium

The absolute and relative importance of the impact is average. It requires specific mitigation measures. This impact is irreversible

I) Stripping of the landscape

The denudation of the landscape will be a negative visual impact in the exploitation phase concerns the presence of irrigated perimeters on several hectares. In fact, ploughing works and the exploitation of irrigated perimeters without the presence of trees will present a bare aspect of the landscape.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Average	Average	Small and Medium

The absolute and relative importance of the impact is average. It requires specific mitigation measures. This impact is irreversible

J) Acceleration of wind speed on the ground

With the lack of plant cover, the wind speed on the ground will accelerate in the perimeters and this can cause damage in the fields, especially for tall stem crops.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Average	Average	Small and Medium

The importance of absolute and relative impact are average. It requires special mitigation measures. This impact is reversible

K) Air pollution through methane emissions

Air pollution by methane emissions during the exploitation phase will be mainly due to rice cultivation. Indeed, rice growing produces anaerobic bacteria and with the appearance of these bacteria, there will be a significant release of methane (CH₄) (biogas) which is a greenhouse gas contributing to climate change phenomena. Methane (CH₄) is considered, after carbon dioxide (CO₂) and freons, to be the third gas responsible for global warming due to the greenhouse effect. Intensive rice cultivation contributes to global warming. It is responsible for the emission of a fairly large quantity of methane (about 120g per kilo of rice), a powerful greenhouse gas.

Methane emission from rice fields results from antagonistic but interdependent microbial activities: in anaerobic soil, so-called "methanogenic" bacteria produce methane, and in aerobic areas, i.e. where oxygen is available (the roots, the soil in contact with them and the soil-water interface), so-called "methanotrophic" bacteria consume up to 90% of the methane produced. It is the methane not consumed by the methanotrophic bacteria that is emitted into the atmosphere.

In rice cultivation, therefore, two types of bacteria act: anaerobic bacteria that develop in the absence of oxygen; and aerobic bacteria that develop in the presence of oxygen. Anaerobic bacteria produce methane, and aerobic bacteria consume it. Irrigation techniques commonly used in rice cultivation favour the main development of anaerobic bacteria, so methane production is only slightly absorbed by aerobic bacteria. As a result, a large amount of methane is produced and released into the atmosphere. However, alternative irrigation techniques could be used to limit this problem.

The production of one kilogram of rice corresponds to the emission of 120 g. of methane¹. Rice farming is therefore the world's second largest producer of methane, with 60 million tonnes/year; just behind ruminant farming, which generates 80 million tonnes/year.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Local	Average	Average	Average	Average	Small and Medium

The importance of absolute and relative impact are average. It requires special mitigation measures. This impact is irreversible

1.2.3.1.2. Positive impacts

A) Groundwater recharge

During the exploitation of the irrigated perimeters, large quantities of water will infiltrate (irrigation surplus) and will feed the groundwater table

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Local	Average	Average	Small and Medium	Reversible

B) Enriching avian biodiversity and protecting crops C) against insects

With the presence of the perimeters, the avifauna will develop and will be varied. The ornithological diversity of the region will be greatly enriched. The presence of certain insects such as locusts, grasshoppers and other insect pests will help to attract birds to the irrigated perimeters.

The second positive impact lies in the fact that birdlife will play an important role in crop protection through the destruction of crop pests.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct / Indirect	Long	Local	Average	Average	Certain and Strong	Reversible

D) Enriching fish and wildlife biodiversity

In the canals and drains, the ichthyofauna will be important. With the presence of water in the hydraulic networks, water reptiles (snakes, lizards, etc.) and amphibians will also be present in ever-increasing numbers. The canals and drains will offer, because of the permanence of the water, enormous fish-farming possibilities that could be exploited.

¹ IRD, *Reducing methane emissions from rice fields*, Scientific news sheets, IRD Microbiology Laboratory, Marseille, May 1999.

With the permanent presence of water in the perimeters, and the new ecological conditions that will result, small animal species adapted to this situation will spontaneously reappear and colonise the area of the perimeters.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Punctual	Average	Average	Small and Medium	Reversible

E) Development of the microfauna

Finally, with the watering and development of rice paddies, the physico-chemical and biological dynamics of micro-organisms in the soil will grow and new types of micro-organisms (anaerobic micro-organisms in constantly wet soils) will appear and develop.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Local	Average	Average	Small and Medium	Reversible

F) Creation of a micro-climate

In the operating phase, three climate elements are involved: relative humidity, temperature and wind. Indeed, with the exploitation of the perimeter, the hygrometry within it, will increase locally and therefore there will be a drop in temperature. The sum of these two elements will lead to a microclimate within the perimeters.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Local	Average	Average	Small and Medium	Reversible

1.2.3.2. Impacts of the project on the human environment in the exploitation phase

1.2.3.2.1. Negative impacts

A) Damage to the animals by wandering and transhumance in the perimeters

The presence of residues of dry rice stalks after the harvest in the irrigated perimeters will lead to the concentration of animals around the trap area and will cause damage in the perimeters: damage to the riders of the distributors, dividers, sprinklers and drains as a result of trampling.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Average	Average	Small and Medium

The absolute and relative importance of the impact is average. It requires specific mitigation measures. This impact is irreversible

B) Damage to the health of the population linked to the development of water-borne diseases

These are mainly malaria and bilharzia.

As far as malaria is concerned, it is the most frequent disease in the project area because it is endemic. With the construction of the water reservoirs the situation could well get even worse. Indeed, the permanent presence of water encourages the multiplication of vectors (Anopheles) and other vectors: mosquitoes of the genus *Culex* (*Culex pipiens*, etc.), vectors of filariasis, mosquitoes of the genus *Aedes*, vectors of dengue and yellow fever. However, the development of Culicidian pressure is not expected to have a significant impact on the intensity of malaria, as its prevalence is already high.

As far as bilharziasis is concerned, its prevalence and intensity may only increase after the development of the irrigated perimeters, as the population of the sites will be inclined to be in regular contact with stagnant water in the irrigated perimeters. The health impacts may come from two different sources, but not exclusive for all individuals: those related to the use of surface water and those related to residence in villages near water reservoirs. The resulting pathologies are urinary or intestinal bilharziasis linked to the use of polluted water, as the reservoirs will probably be used for washing, bathing and water supply, as in the areas where the reservoirs are in operation.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Low	Average	Strong	Strong	Small and Medium

The absolute importance of the impact is medium and its relative importance is high because of the value of the affected component. It requires special mitigation measures. This impact is reversible

1.2.3.2.2. Positive impacts

A) Development of agricultural and market gardening activities

The development of irrigated perimeters will allow the development of agricultural activities in the area. Indeed, the permanent presence of water in the traps will promote water control and the multiplication of crops throughout the year. Market gardening will also be able to develop around the irrigated perimeters because of the permanent presence of water.

The introduction of intensive rice cultivation and market gardening in the project area will lead to diversification and an increase in agricultural production.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Local	Strong	Major	Small and Medium	Reversible

B) Improvement of pastoral production

In the exploitation phase, with the presence of the perimeters, livestock farming will develop due to the presence at certain times of the year, especially in dry periods, of crop residues in the crates. On the other hand, with the money earned from the sale of agricultural products and the need to integrate agriculture/livestock farming, farmers will increase their livestock numbers. The project will therefore be a real asset in improving pastoral production.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Local	Average	Average	Small and Medium	Reversible

C) Development of trade and income-generating activities

The general increase in people's income generated by rice-growing activities, particularly the sale of rice, will stimulate the region's economy, in terms of trade and the development of crafts and small-scale industry (blacksmiths for the repair of agricultural equipment in particular).

Indeed, on an economic level, the development of irrigated perimeters constitutes a major asset for increasing the income of the beneficiary populations. Based on the analysis of the results of the interview with the different components (council, young people and women) of the villages in the project area, the impacts on the economic activities of the beneficiary populations are, among others, :

- Diversification of sources of income through the practice of irrigated and dry crops, market gardening, arboriculture (planting of fruit trees);
- Increasing yields by controlling water use and supervising technical services;
- the development of commercial exchanges between the populations and the whole region;
- the development of utilitarian crafts and services due to the increased need for agricultural materials and tools that can be made and/or repaired by local artisans;
- financial participation in local development by the population as a result of increased income.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Indirect	Long	Local	Strong	Major	Certain and Strong	Reversible

D) Improvement of the socio-economic structure

The revitalisation of agriculture, livestock farming and the development of trade in food and cash crops will lead to an increase in the cash income of farmers, but also to an increase in regional income, GDP and GDP. The improvement of the economic structure which will result in :

- the modification of the economic activity of the inhabitants of the area ;
- the easing of constraints in production, trade and pricing;
- the reduction of the classes with precarious income and the increase of the middle classes;
- increasing opportunities for the acquisition of factors of production ;
- the increase in the exchange value of certain goods and services ;
- increasing economic exchanges.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Local	Strong	Major	Small and Medium	Reversible

E) Revaluation of the land and economic breakthrough of the area

The economic growth of the project area is today slowed down by the negative effects of the degradation of the agro-economic production system and on the marketing of goods. The performance of an economic production system implies the fluidity of human movement, the speed of transport of goods and services, the security of production in circulation, the access of the area's producers to local markets, the financial accessibility of locally produced goods and the possibility for each environment to develop its comparative advantages in commercial exchanges. In the current context of economic production in the project area, these conditions for stimulating agro-economic activity are hampered by problems of production, conservation, transport and marketing caused by the difficult and precarious conditions in which the population lives.

The benefits brought by the project will therefore inevitably alleviate the constraints of the inhabitants' productive activity and enable the area to increase its agro-economic production. The expected economic growth will be promoted essentially by the rapid transport of products from local markets to the main distribution centres (the sale of products from the area to local markets).

With the improved transport and communication conditions brought about and the subsequent agricultural transformation, there will certainly be an increase in the interrelationship between agricultural and commercial assets in rural agglomerations and with urban centres. This will increase the motivation to produce in agriculture and interest in commercial activity. In this context, the inhabitants of the area will become more and more attached to economic production in their environment. This will lead to an increase in the value of rural land and an economic breakthrough.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Local	Strong	Major	Small and Medium	Reversible

F) Development of social relations and revaluation of the local rural economy

Different groupings exist as constituted groups that are part of the social and agricultural life in the project area. However, they are in a state of near dysfunction under the influence of internal relational and external structural factors.

With the project and the organisational requirements of its operation, the existing groupings will be reconstituted and resume their operational activity. The technical organisation of the project will increase the level of involvement and participation of the members. Depending on the interplay of interests linked to the project, the affinities determined by the fields of agricultural production and social affiliations, new groups will be formed.

The development of agriculture through the establishment of the agropole of the Kara basin will also have the advantage of facilitating exchanges between the agglomerations of the zone and remote localities whose development of activities depends on the agro-economy (Kara, Bassar, Sokodé, Dapaong, Atakpamé, Lomé, etc.).

There will certainly be an increase in the interrelationship between agricultural and commercial assets in rural agglomerations. In this context, the inhabitants of the area will become more and more attached to the economic production in their environment. This will lead to a revaluation of the rural economy.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Local	Strong	Major	Certain and Strong	Reversible

G) General improvement of the quality of life of farmers

With the economic spin-offs from rice cultivation in the perimeter, the living conditions and the living environment of the populations will improve. Housing will improve along with food and means of transport.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Indirect	Long	Local	Strong	Major	Certain and Strong	Reversible

H) Improvement of the living environment and the social well-being of the population

The development of agriculture, the increase of the population's agricultural income and the upgrading of the local rural economy will improve the living environment and social welfare and thus the quality of life of the people in the area.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Indirect	Long	Local	Strong	Major	Certain and Strong	Reversible

1) Evolution of the socio-economic trajectory of young people and inhibition of rural exodus

The young people in the project area are mainly involved in agriculture, commerce and handicrafts as social integration activities. Agriculture therefore remains the social field of production and the development of other activities to satisfy their needs. With the exception of the urban agglomerations (Kara, Kanté, Niamtougou and Bassar), the economy in the localities is based on agricultural production.

The exploitation of irrigated perimeters and the development of the agropole in the Kara basin in general will at the same time create new investment projects at the individual or associative level. The agropole in the Kara basin will be experienced and perceived as a favourable circumstance for trade-oriented economic initiatives that go beyond the usual agricultural production environment. One of the expected effects is the reconversion of young people in new activities undertaken as opportunities offered by the irrigated perimeters and the increase of income. This will lead, at the individual level, to the change or diversification of economic activities and changes in the socio-professional structure.

By deciding to try out another economic activity, a young person moves from one status of activity to another. From being a farmer, he can become a retailer, trader, craftsman or other. In the long term, the project will then function as a factor of upward mobility in society and a source of inhibition of the rural exodus still alive in the project area.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Indirect	Long	Local	Strong	Major	Certain and Strong	Reversible

1.2.4. DESCRIPTION AND EVALUATION OF IMPACTS AT THE END OF THE PROJECT PHASE

The project area must be rehabilitated taking into account developments during the life of the project. Elements to be taken into account when analysing developments include, among others

- the landscape has evolved with vegetation regrowth at the level of soils previously degraded during the works, etc. ;
- there has been a change in the site. A new landscape has been created with the facilities and now the site is perceived differently. The uses of the site may have changed and if the project has been carried out well, the population has become accustomed to the different developments;
- we will probably never find exactly the original state of the site.

Of course, it is difficult, if not futile, to try to predict what will be the requirements of the generations that will have to take the actual decision to dismantle the project in 20 or 30 years' time. But this principle of restoration respects the spirit of the legislation in force according to one of the principles of sustainable development: "To bequeath to future generations the same economic, environmental and territorial bases as those from which we have benefited".

At the end of the project's operation and before the promoter leaves the premises, three scenarios are presented according to the evolution of the project and its appropriation by the beneficiary populations.

- The project has been successful and is sustainable. Management will have to be handed over to the beneficiary populations
- The project was a failure. In this case, it will either have to be dismantled or abandoned as it stands.

1.2.4.1. Scenario 1: Disposal case

1.2.4.1.1. Description and evaluation of impacts on the biophysical environment

A) *Negative impacts*

A1) Modification of soil structure

The soil structure will continue to be modified by immersion, which will cause a "melting" of the aggregates and a settling of the superficial horizons, which, even after drainage, will reduce the aeration of the soil and the penetration of plant roots (in the case of dry off-season crops).

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Local	Average	Average	Average	Average	Small and Medium

The importance of absolute and relative impact are average. It requires special mitigation measures. This impact is reversible

A2) Salinisation, alkalisation and alkalinisation of soils

In the divestment phase, the phenomena of salinisation, alkalisation and alkalinisation will continue as a result of continued irrigation with water that is overloaded with salts due to the use of chemical fertilisers.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Local	Average	Average	Average	Average	Small and Medium

The absolute and relative magnitudes of the impact are average. It requires specific mitigation measures. This impact is reversible.

A3) Degradation of soil physico-chemical parameters

The degradation of the physico-chemical parameters of the soil caused by the phenomena of salinisation and alkalisation will continue during the disposal phase.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Indirect	Long	Local	Average	Average	Average	Average	Small and Medium

The absolute and relative magnitudes of the impact are average. It requires specific mitigation measures. This impact is irreversible.

A4) Soil pollution by solid vegetable waste

When the project is handed over to the beneficiaries, the soil will still be polluted by the residues from rice and other crops. Indeed, at the time of the rice harvest and after threshing the ears, the stems that are unusable by the farmers will be left on the irrigated perimeters or in the places where the rice would have been threshed.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Average	Average	Small and Medium

The absolute and relative magnitudes of the impact are average. It requires specific mitigation measures. This impact is irreversible.

A5) Loss of birdlife

Just as in the exploitation phase of the irrigated perimeters, at the handover of the project, the avifauna will be victims of daily hunting because of the very important damages on the rainfed cereal crops and the rice traps at the rice maturation phase which lasts three (03) months. These are granivorous birds such as the weaver, in particular.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Low	Minor	Minor	Low	Small and Medium

The absolute significance of the impact is minor and its relative importance is small. However, it is reversible and does not require any particular mitigation measures.

A6) Mosquito Proliferation

The presence of water permanently in the irrigated perimeters, added to the stagnant water bodies of small dams, will always be a factor in the multiplication of vectors (Anopheles) and other vectors, notably, mosquitoes of the genus Culex (*Culex pipiens*, etc.), vectors of filariasis, mosquitoes of the genus Aedes, vectors of dengue and yellow fever.

However, the development of Culicidian pressure is not expected to have a significant impact on the intensity of malaria, as its prevalence is already high.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Average	Average	Small and Medium

The absolute and relative magnitudes of the impact are average. It requires specific mitigation measures. This impact is irreversible

A7) Stripping of the landscape

The landscape will still be bare at the time of the transfer due to the presence of irrigated perimeters on several hectares. In fact, ploughing and the use of irrigated perimeters without any trees will present a bare aspect of the landscape.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Average	Average	Small and Medium

The absolute and relative magnitudes of the impact are average. It requires specific mitigation measures. This impact is irreversible

A8) Acceleration of wind speed on the ground

With the lack of vegetation cover, the wind speed on the ground will always accelerate in the perimeters at the handover.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Average	Average	Small and Medium

The importance of absolute and relative impact are average. It requires special mitigation measures. This impact is reversible.

A9) Air pollution through methane emissions

When the project is handed over, air pollution from methane emissions will still be mainly due to rice cultivation. Indeed, rice growing produces anaerobic bacteria and with the appearance of these bacteria, there will be a significant release of methane (CH₄) (biogas) which is a greenhouse gas contributing to climate change phenomena. Methane (CH₄) is considered, after carbon dioxide (CO₂) and freons, to be the third gas responsible for global warming due to the greenhouse effect. Intensive rice cultivation contributes to global warming. It is responsible for the emission of a fairly large quantity of methane (about 120g per kilo of rice), a powerful greenhouse gas.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Local	Average	Average	Average	Average	Small and Medium

The importance of absolute and relative impact are average. It requires special mitigation measures. This impact is irreversible

B) Positive impacts

B1) Groundwater recharge

During the operation of the irrigated perimeters after the cession, large quantities of water will still infiltrate (irrigation surplus) and will continue to feed groundwater tables.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Local	Average	Average	Small and Medium	Reversible

B2) Enrichment of avian biodiversity and protection of crops against insects

With the presence of the perimeters at the sale, the birdlife will continue to be developed and will always be varied. The ornithological diversity of the region will be greatly enriched. The presence of certain insects such as locusts, grasshoppers and other pests will help to attract birds to the irrigated perimeters.

The second positive impact lies in the fact that birdlife will play an important role in crop protection through the destruction of crop pests.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct / Indirect	Long	Local	Average	Average	Certain and Strong	Reversible

B3) Enrichment of ichthyofauna biodiversity

In the canals and drains, the ichthyofauna will be important. With the presence of water in the hydraulic networks, water reptiles (snakes, lizards, etc.) and amphibians will always be present in ever-increasing numbers. The canals and drains will continue to offer, because of the permanence of the water, enormous fish-farming possibilities that could be exploited.

With the permanent presence of water in the perimeters, and the new ecological conditions that will result, small animal species adapted to this situation will spontaneously reappear and colonise the area of the perimeters.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Punctual	Average	Average	Small and Medium	Reversible

B4) Development of the microfauna

With the development of rice paddies, the physico-chemical and biological dynamics of microorganisms in the soil will always be increasing and new types of microorganisms (anaerobic microorganisms in constantly moist soils) will always be present and will continually develop.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Local	Average	Average	Small and Medium	Reversible

B5) Creation of a micro-climate

Just as in the operating phase, three climate elements are always involved in the transfer: relative humidity, temperature and wind. Indeed, with the exploitation of the perimeter, the hygrometry within it will always increase locally and therefore there will be a drop in temperature. The sum of these two elements will continue to maintain a microclimate within the perimeters.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Local	Average	Average	Small and Medium	Reversible

1.2.4.1.2. Description and evaluation of impacts on the human environment

A) Negative impacts

When the project is handed over to the beneficiary populations, the same negative impacts on the human environment at the time of its exploitation will always appear. These are as follows:

A1) Damage to the animals during raving and transhumance in the perimeters

The presence of residues of dry rice stalks after the harvest in the irrigated perimeters will lead to the concentration of animals around the trap area and will cause damage in the perimeters: damage to the riders of the distributors, dividers, sprinklers and drains as a result of trampling.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Average	Average	Average	Average	Small and Medium

The absolute and relative magnitudes of the impact are average. It requires specific mitigation measures. This impact is irreversible

A2) Development of water-borne diseases The

water-borne diseases that will continue to be prevalent are malaria and bilharzia.

As far as malaria is concerned, it is the most frequent disease in the project area because it is endemic. The development of Culicidian pressure is not expected to have a significant impact on the intensity of malaria, as its prevalence is already high.

As far as bilharziasis is concerned, its prevalence and intensity can only increase after the development of the irrigated perimeters, as the population of the sites will be inclined to be in regular contact with stagnant water in the irrigated perimeters.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Low	Average	Strong	Strong	Small and Medium

The absolute importance of the impact is medium and its relative importance is high because of the value of the affected component. It requires special mitigation measures. This impact is reversible

B) Positive impacts

When the project is handed over to the beneficiary populations, the same positive impacts on the human environment at the time of its exploitation will always appear. These are :

- Development of agricultural and market gardening activities,
- Improvement of pastoral production,
- Development of trade and income-generating activities,
- Improvement of the socio-economic structure,
- Revaluation of the land and economic breakthrough of the area,
- Development of social relations and revaluation of the local rural economy,
- General improvement of the quality of life of farmers,
- Improvement of the living environment and the social well-being of the population,
- Evolution of the socio-economic trajectory of young people and inhibition of rural exodus.

1.2.4.2. Scenario 2: Decommissioning case

1.2.4.2.1. Description and evaluation of impacts on the biophysical environment

A)

Negative impacts

A1) Soil pollution

The products of dismantling activities (stripping and scraping rubble, rubble from the destruction of buildings, aerial equipment, underground equipment and works, and excavated waste, etc.) buried waste brought to light, etc. will pollute the soil.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Punctual	Average	Minor	Average	Average	Small and Medium

The absolute importance of the impact is minor and its relative importance average because of the value of the affected component. It requires special mitigation measures. The impact is reversible.

A2) Air pollution

This pollution will be caused by dust and smoke from heavy machinery and falling rubble and other debris during dismantling.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Punctual	Average	Minor	Average	Average	Small and Medium

The absolute importance of the impact is minor and its relative importance average because of the value of the affected component. It requires special mitigation measures. The impact is reversible.

A3) Water pollution

The dismantling works that will have polluted the soil could lead to water pollution through runoff.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Punctual	Average	Minor	Average	Average	Small and Medium

The absolute importance of the impact is minor and its relative importance average because of the value of the affected component. It requires special mitigation measures. The impact is irreversible.

A4) Noise pollution

Workers on the dismantling site will be affected by the noise nuisance will originate from the operation of the machinery that will be used during the clean-up of the site and the fall of rubble and other debris and the noise of the dismantling work on the station's structures.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Short	Punctual	Average	Minor	Average	Average	Small and Medium

The absolute importance of the impact is minor and its relative importance average because of the value of the affected component. It requires special mitigation measures. The impact is reversible.

B) Positive impacts

No negative impact on the biophysical environment was identified at the time of decommissioning.

1.2.4.2.2. Description and evaluation of impacts on the human environment

A) Negative impacts

A1) Reduction of agricultural production

The dismantling of irrigated perimeters will inevitably lead to a fall in agricultural production with its corollaries such as a reduction in agricultural production. Indeed, the dismantling of irrigated perimeters and lowlands will lead to a reduction in agricultural production due to the lack of infrastructure that would allow the development of intensive, high-yield and high-productivity agriculture.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Indirect	Long	Local	Strong	Major	Strong	Strong	Small and Medium

The importance of absolute impact is major and its relative importance strong. It requires specific mitigation measures. This impact is reversible.

A2) Loss of fishing activities

The dismantling of the irrigated perimeters will certainly lead to the disappearance of the fish traps that used to allow fishing activities in the area, resulting in the loss of these activities.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Direct	Long	Punctual	Low	Average	Strong	Strong	Small and Medium

The absolute importance of the impact is medium and its relative importance is high because of the value of the affected component. It requires special mitigation measures. This impact is reversible

A3) Loss of income and impoverishment

The reduction of agricultural activities will lead to a loss of income for producers and thus to the impoverishment of the population.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Indirect	Long	Local	Strong	Major	Strong	Strong	Small and Medium

The importance of absolute impact is major and its relative importance strong. It requires specific mitigation measures. This impact is reversible.

1.2.4.3. Scenario 3: Cases of abandonment

1.2.4.3.1. Description and evaluation of impacts on the biophysical environment

A) Negative impacts

No negative impact was identified at the level of the biophysical environment during the abandon phase of the irrigated pre-meters at the end of the project.

B) Positive impacts

➤ Improvement of vegetation cover

At the end of the project, many traps in the irrigated perimeters will be abandoned, allowing nature to regain its rights through the regrowth of vegetation.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Local	Low	Average	Certain and Strong	Reversible

➤ Groundwater recharge

When abandoned, even if the irrigated perimeters will no longer be used, large quantities of water will infiltrate (irrigation surplus) and will feed the groundwater tables

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Local	Average	Average	Small and Medium	Reversible

➤ Enriching avian biodiversity

When the perimeters are abandoned, the birdlife that would have been installed during the exploitation phase will still be present. The ornithological diversity of the region will be greatly enriched. The presence of certain insects such as locusts, grasshoppers and other insect pests will help to attract birds to the abandoned irrigated perimeters.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct / Indirect	Long	Local	Average	Average	Certain & Strong	Reversible

➤ Enriching fish and wildlife biodiversity

In canals and drains, abandoned and not dismantled, the ichthyofauna will always be important. With the presence of water in the hydraulic networks, water reptiles (snakes, lizards, etc.) and amphibians will also be present in ever-increasing numbers.

With the permanent presence of water in the perimeters, and the new ecological conditions that will result, small animal species adapted to this situation will continue to develop and colonise the area of the abandoned perimeters.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Punctual	Average	Average	Small and Medium	Reversible

➤ Development of the microfauna

The new types of microorganisms (anaerobic microorganisms of the constantly wet soil) that will have appeared during the exploitation phase when the irrigated perimeters are put in water will continue to develop when the perimeters are abandoned.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Occurrence	Reversibility
Positive	Direct	Long	Local	Average	Average	Small and Medium	Reversible

1.2.4.3.2. Description and evaluation of impacts on the human environment

A) Negative impacts

On the human environment, the negative impacts observed during the exploitation of the irrigated perimeters such as the damage caused by animals raving and transhumance in the perimeters as well as the development of water-borne diseases such as malaria and bilharziasis will also continue.

To this must be added the reduction of the positive impacts that had appeared during the exploitation phase. Thus, when the project is abandoned, there will be :

- The decrease in agricultural and market gardening activities ;
- The reduction of commercial activities related to irrigated agriculture and income-generating activities;
- The dislocation of the socio-economic structure ;
- The decline in the economic breakthrough of the zone ;
- The deterioration of social relations and the devaluation of the local rural economy;
- The general deterioration in the quality of life of farmers;
- Deterioration of the living environment and the social well-being of the population ;
- The decline in the socio-economic trajectory of young people and the resumption of rural exodus.

Impact assessment

Nature	Interaction	Duration	Scope	Intensity	Absolute Importance	Value of the component	Relative Importance	Probability of occurrence
Negative	Indirect	Long	Local	Average	Average	Strong	Strong	Small and Medium

The absolute importance of all impacts is medium and their relative importance is high. It requires specific mitigation measures. This impact is reversible.

B) Positive impacts

When the project was abandoned, no positive impact was identified on the human environment.

2- ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (PGES)

2.1. MEASURES TO MITIGATE NEGATIVE IMPACTS IN THE PREPARATORY PHASE

2.1.1. MEASURES TO MITIGATE NEGATIVE IMPACTS ON THE BIOPHYSICAL ENVIRONMENT

2.1.1.1. Loss of vegetation

- Clearly define cleaning areas to restrict deforestation;
- Limit yourself to using only the areas strictly necessary for the work;
- Ensure the protection of trees and plants on the site and adjacent properties in the irrigated perimeters;
- Spare the trees in the gallery forests;
- Save in the perimeter area anthropogenic trees of economic value (shea, shea, oil palm, mango and kapok trees) and any vegetation of any tree over 6 metres high that does not interfere with the work or crops;
- Prohibit the installation of construction site lifebases on wooded sites.

Level of likelihood of success of the mitigation measure: Low

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Long	Local	Average	Medium	Likely and low

The significance of the residual impact is still moderate. It requires compensatory measures

Compensatory measure :

- Carry out compensatory reforestation around the irrigated perimeters;
- Enrich the borders of gallery forests crossing irrigated perimeters and in community forests with local natural species on about 30 ha. with local natural species ;
- Give priority to species threatened with extinction or on the IUCN Red List;
- Subcontract the reforestation to a specialised structure (preferably an NGO);
- Reforestation with the participation of the local population (Community Reforestation).

Responsible for implementation: Promoter

Responsible for monitoring and control:

ANGE **Costs:** 21 470 000 F CFA²

² These costs include an amount of 2 700 000 F CFA for the perimeter to be irrigated from the Broukou mini-dam, 16 255 000 F CFA for the perimeter to be irrigated from the Kpassidè mini-dam and 2 515 000 F CFA for the perimeter to be irrigated from the Léon mini-dam.

2.1.1.2. Reduction of medicinal plants

- Spare medicinal plants as much as possible when clearing the sites;
- If possible, transpose medicinal plants that are not hydromorphic to land-based sites.

Level of likelihood of success of the mitigation measure: Low

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Long	Local	Average	Medium	Likely and low

The significance of the residual impact is still moderate. It requires compensatory measures

2.1.1.3. Loss of wildlife

- Limit yourself to using only the areas that are strictly necessary for the construction of the works in order to preserve as much vegetation as possible;
- Raise awareness of the company's work on wildlife protection ;
- Do not poach. The company will be held responsible for any infringement observed by the project owner, the control office or the competent services of the Ministry of the Environment and will be subject to the penalties provided for by law ;
- Do not slaughter and/or capture a wild animal on site ;
- Do not transport wild meat in construction site trucks by construction site personnel. The company will be held responsible for any infringement noted by the competent services of the Ministry of the Environment, and will be subject to the penalties provided for by law ;
- Immediately report any accidental capture or killing of wild animals by the company or its staff to the nearest competent department of the Ministry of the Environment; where appropriate, this act will be considered as deliberate poaching) and will be sanctioned as such.

Level of likelihood of success of the mitigation measure: Low

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Long	Local	Average	Medium	Likely and low

The significance of the residual impact is still moderate. It requires compensatory measures

Compensatory measure :

- Carry out compensatory reforestation around the irrigated perimeters;
- Enrich the edges of gallery forests crossing the irrigated perimeters with local natural species;
- Give priority to species threatened with extinction or on the IUCN Red List;
- Subcontract the reforestation to a specialised structure (preferably an NGO);
- Reforestation with the participation of the local population.

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: See cost of compensatory reforestation for the destruction of trees.

2.1.1.4. Green solid waste on the ground

- Clearly define cutting areas to restrict deforestation.
- Limit yourself to using only the surface areas strictly necessary for the work.
- Collect and make available to local communities for appropriate use tree sections, tree stumps and branches from felled trees.
- Store site cleaning products and use them later as a cover for household waste.
- Do not dump excavated material beyond the site perimeter on private land.

Level of probability of success of the mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Long	Local	Average	Medium	Likely and low

The significance of the residual impact is still moderate. It requires compensatory measures

2.1.1.5. Degradation of the soil structure

- Limit yourself to using only the areas strictly necessary for the perimeters to be irrigated;
- Limiting land wastage through uncontrolled subsoiling

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.1.1.6. Air pollution

- Comply with WHO air quality guidelines (see normative framework);
- If necessary, water the areas with high dust emission;
- Use new equipment and vehicles or vehicles in good condition;
- Ask for the services of machines and trucks whose technical inspections are up to date or machines in good condition;
- Control the quality of the engines of the machines by regular maintenance;
- Prohibit the use of adulterated fuel and oils by vehicles/engines;
- Prohibit the burning of waste on the building site ;
- Prohibit the drivers of vehicles and construction equipment from leaving the engine of the equipment or vehicles running during work stoppages.

In any case, the emission of gases and other suspended particles must comply with the accepted standards presented in Tables 9 and 10.

Table 9: Limit standards for the release of gases and other suspended particles in the European Union

Polluting products	Average limit value (EU)
Ozone (O ₃)	0.08 ppm
Carbon monoxide (CO)	40 micrograms/m ³
Sulphur dioxide (SO ₂)	80 micrograms/m ³
Nitrogen Dioxide (NO ₂)	200 micrograms/m ³
Lead (Pb)	2micrograms/m ³
Particles in suspension (< 10 microns)	80 micrograms/m ³

Source: GUIGO M. et al: Environmental Management and Impact Studies

Table 10: WHO air quality guidelines

Polluting products	Average exposure time	Value in µg/m3
Sulphur dioxide (SO ₂)	24 hours	125 (1st intermediate target) 50 (2nd intermediate target) 20 (Guidelines)
	10 minutes	500 (Guidelines)
Nitrogen Dioxide (NO ₂)	1 year	40 (Guidelines)
	1 hour	200 (Guidelines)
Particulate matter PM ₁₀	1 year	70 (1st intermediate target) 50 (2nd intermediate target) 30 (3rd intermediate target) 20 (Guidelines)
	24 hours	150 (1st intermediate target) 100 (2nd intermediate target) 75 (3rd intermediate target) 50 (Guidelines)
Particulate matter PM _{2.5}	1 year	35 (1st intermediate target) 25 (2nd intermediate target) 15 (3rd intermediate target) 10 (Guidelines)
	24 hours	75 (1st intermediate target) 50 (2nd intermediate target) 37.5 (3rd intermediate target) 25 (Guidelines)
Ozone	8 hours per day maximum	160 (1st intermediate target) 100 (Guidelines)

Source: World Health Organization (WHO). Air Quality Guidelines Global Update, 2005

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.1.1.7. Surface water pollution

- Clearly define the clearing areas (brush clearing) to be limited to the edge of gallery forests ;
- Do not place debris on areas that have not been stripped and covered with vegetation on the edges of watercourses;
- Do not carry out clearing with machinery on the banks of watercourses.

Level of likelihood of success of the mitigation measure: Strong

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.1.1.8. Increase in the noise level in the noise environment of the sites

- Use new equipment and vehicles or vehicles in good condition;
- Prohibit drivers of vehicles and construction equipment from leaving engines running unnecessarily;
- Regulating vehicle traffic ;
- Do not honk the horn unintentionally;
- Carry out the work during regular business hours permitted by regulations.

In any case, noise emission and noise pollution must comply with the standards presented in Tables 11 and 12. Above this noise level, hearing protection equipment must be provided to workers.

Table 11: Noise emission and noise pollution limit standards

Slice	Average limit value (EU)
Daily average for the creation of a route	65 decibels
Daily average in quiet residential areas	60 decibels
Daily average in noisy residential areas	70 decibels

Source: GUIGO M. et al: Environmental Management and Impact Studies

Table 12: WHO guidelines for noise levels

Receiver	One hour LAeq (dBA)	
	Daytime 07.00 - 22.00 hrs.	By night 22.00 - 07.00 hrs.
Residential; institutional; educational	55	45

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.1.2. MEASURES TO MITIGATE NEGATIVE IMPACTS ON THE HUMAN ENVIRONMENT

2.1.2.1. Damage to cultural and religious property

- Proceed with the exact delimitation of sacred forests in collaboration with the populations and owners;
- Preserve sacred forests by limiting clearing at the edge of these forests.

Likelihood of success of the mitigation measure: Strong

Responsible for implementation : Promoter

Responsible for monitoring and control : ANGE

Cost : Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Fully mitigated impact / No residual impact

2.1.2.2. Temporary loss of crops and crop year

- Warn farmers on the perimeters to be irrigated that work is imminent;
- Compensate for crop losses for one crop year for all farmers identified on the sites of the perimeters to be irrigated.

Likelihood of success of the mitigation measure: Strong

Responsible for implementation : Promoter

Responsible for monitoring and control : ANGE

Cost : See Resettlement Action Plan (RAP)

Evaluation of the new value of the impact (Residual Impact)

Fully mitigated impact / No residual impact

2.1.2.3. Respiratory nuisance at the level of the employees of the construction company

- Respect the guidelines of WHO on air quality (see normative framework);
- Spray in areas that may cause dust emissions;
- Distribute appropriate personal protective equipment (PPE) to workers on construction sites;
- Ensure that PPE is actually worn by workers and, if necessary, punish recalcitrant workers.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.1.2.4. Noise pollution at the level of the employees of the works company

- Use new equipment and vehicles or vehicles in good condition;
- Request the services of equipment and trucks with up-to-date technical inspections or equipment in good condition.
- Check the noise level of heavy machinery and tools,
- Carry out the work only during regular business hours authorized by the regulations;
- Prohibit drivers of vehicles and construction equipment from leaving engines running unnecessarily;
- Avoid untimely truck horns;
- Equip employees with suitable PPE and ensure that it is worn;
- Do not expose any employee to a noise level higher than 85 dB(A) for a period of more than 8 hours a day without wearing appropriate PPE ;

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.2. MEASURES TO MITIGATE NEGATIVE IMPACTS DURING THE CONSTRUCTION PHASE

2.2.1. MEASURES TO MITIGATE NEGATIVE IMPACTS ON THE BIOPHYSICAL ENVIRONMENT

2.2.1.1. Degradation of the soil structure

- Limit yourself to using only the areas strictly necessary for the work according to the progress of the installation or construction of the works in order to preserve the soil as much as possible;
- Properly compact the soil during backfilling in the excavated areas to ensure better stability;
- During the work, the excavation depths and excavations determined by the plans must be respected;
- Protect areas prone to erosion by grassing or riprap.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.2.1.2. Soil pollution by solid waste

- Have daily solid waste collection bins at all levels of the site;
- Empty regularly and in any case before overflowing, all the dustbins into the bins or into a skip ;
- Regularly transfer the waste from the bins or skip before overflowing to a landfill approved by the project owner (Developer) or the Project Manager on the building sites;
- Removing inert waste from sites or reusing other inert waste such as sand and gravel for other purposes.
- Collect and make available to local communities for appropriate use tree sections, tree stumps and branches of felled trees

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control:

ANGE **Costs:** 1 500 000 F CFA

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.2.1.3. Increase in air pollution

- Comply with WHO air quality guidelines (see normative framework);
- If necessary, water the areas with high dust emission;
- Use new equipment and vehicles or vehicles in good condition;
- Ask for the services of machines and trucks whose technical inspections are up to date or machines in good condition;
- Control the quality of the engines of the machines by regular maintenance;
- Prohibit the use of adulterated fuel and oils by vehicles/engines;
- Prohibit the burning of waste on the building site ;
- Prohibit the drivers of vehicles and construction equipment from leaving the engine of the equipment or vehicles running during work stoppages.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company Evaluation of

the new value of the impact (Residual impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.2.1.4. Surface water pollution

- Do not place debris on areas that have not been stripped and covered with vegetation on the edges of watercourses;
- Do not clear the banks of watercourses with machinery;
- Do not bring cleaning products into contact with surface water;

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.2.1.5. Surface water depletion

- Define the allocation of water on the building site,
- Implement and organise the monitoring of water consumption;
- Rational use of water resources ;
- Train and sensitise workers to good water management on the site.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.2.1.6. Increase in the noise level in the noise environment of the sites

- Use new equipment and vehicles or vehicles in good condition;
- Prohibit drivers of vehicles and construction equipment from leaving engines running unnecessarily;
- Regulating vehicle traffic ;
- Do not honk the horn unintentionally;
- Carry out the work during regular business hours permitted by regulations.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.2.2. MEASURES TO MITIGATE NEGATIVE IMPACTS ON THE HUMAN ENVIRONMENT

2.2.2.1. Respiratory nuisance at the level of the company's employees work related to air pollution

- Comply with WHO air quality guidelines (see Normative framework);
- Spray in areas that may cause dust emissions;
- Distribute appropriate personal protective equipment (PPE) to workers on construction sites;
- Ensure that PPE is actually worn by workers and, if necessary, punish recalcitrant workers.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: See Costs of measures against the risks of accidents at work and damage to workers' health.

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.2.2.2. Respiratory health at the population level related to the air pollution

- Frequent watering of the tracks used by vehicles transporting building materials across built-up areas.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.2.2.3. Noise pollution at the level of the employees of the works company

- Use new equipment and vehicles or vehicles in good condition;
- Request the services of equipment and trucks with up-to-date technical inspections or equipment in good condition.
- Check the noise level of heavy machinery and tools,
- Carry out the work only during regular business hours authorized by the regulations;
- Prohibit drivers of vehicles and construction equipment from leaving engines running unnecessarily;
- Avoid untimely truck horns;
- Equip employees with suitable PPE and ensure that it is worn;
- Do not expose any employee to a noise level higher than 85 dB(A) for a period of more than 8 hours a day without wearing appropriate PPE ;

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract of the works company

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.3. MEASURES TO MITIGATE NEGATIVE IMPACTS IN THE EXPLOITATION PHASE

2.3.1. MEASURES TO MITIGATE NEGATIVE IMPACTS ON THE BIOPHYSICAL ENVIRONMENT

2.3.1.1. Modification of soil structure

- Do not overwater to prevent leaching of nutrients from the soil;
- Adopt the Intensive Rice System (IRS), which consumes little water and chemical fertiliser but is highly productive per hectare.
- Alternate crops to allow nutrients to replenish ;
- Incorporate organic manure into soil improvers;
- Favour biological control for soil maintenance and improvement over chemical control³
- Significantly reduce the quantities of inputs usually used ;
- Encourage the use of registered pesticides for the benefit of all (unregistered) vendors.
- To associate structures such as ITRA, ICAT and the NGO GRAPHE in the implementation of an awareness and technical support programme for the development of the practice of the Intensive Rice Growing System (IRS).

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control:

ANGE Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.3.1.2. Salinisation, alkalisation and alkalinisation of soils

- Adjust the flow of water applied to the land, to avoid over-watering (including a device to cut off the water supply to the irrigation channels) and waterlogging;
- Establish and maintain an appropriate perimeter drainage system;
- Monitoring soil salinity and alkalinity as part of the research and development support programme;
- To set up an awareness and technical support programme for the development of appropriate water and crop management practices that promote the drainage of plots after rice cultivation.
- Raising awareness among farmers and insisting on a considerable reduction in the quantities of inputs usually used
- Encouraging the use of registered pesticides for the benefit of all (unregistered) vendors

³ See the experience of the NGO AGIDE, which has developed fungus-based fertilisers and pesticides called **CHAMPIGROW** to restore soil fertility and crop health.

- Favour biological control for soil maintenance and improvement over chemical control⁴
- Adopt the System of Intensive Rice Growing (SRI), which consumes little water and chemical fertiliser but is highly productive per hectare.
- Monitoring soil salinity and alkalinity as part of the research and development support programme;
- To associate structures such as ITRA, ICAT and the NGO GRAPHE in the implementation of an awareness and technical support programme for the development of the practice of the Intensive Rice Growing System (IRS).

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control:

ANGE Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.3.1.3. Degradation of soil physico-chemical parameters

- Implement the same measures as those applied to the salinisation, alkalinisation and alkalisation of soils

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control:

ANGE Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.3.1.4. Soil pollution by solid plant waste

- Deposit rice harvest residues outside the perimeters for livestock;
- Initiate projects to transform rice residues into cooking charcoal for households and compost for the manufacture of organic fertiliser⁵
- Separate crop residues from input packaging (empty cans and bags, etc.).
- Collect all input bags, packaging and cans and see how much of them can be reused;
- Carefully destroy all sachets, packaging and drums of contaminated inputs (see risk of contamination of populations).

⁴ Ditto

⁵ See the experience of the NGO AGIDE (Tsévié, Kara)

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control:

ANGE Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.3.1.5. Loss of terrestrial vegetation

- Carry out compensatory reforestation during the preparatory and construction phases.
- During the exploitation phase, maintain the plants planted during the development of the project's perimeters;
- Protect gallery forests and plant cover that would not interfere with ploughing in the perimeters.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: See **costs of** vegetation degradation in the preparatory phase.

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.3.1.6. Loss of terrestrial wildlife

- Carry out compensatory reforestation during the preparatory and construction phases.
- Maintain the exploitation phase of the plants planted during the project;
- Protect gallery forests and plant cover that does not interfere with ploughing in the perimeters;
- Use registered pest and weed control products in irrigated perimeters.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: See **costs of** vegetation degradation in the preparatory phase

Evaluation of the new impact value (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.3.1.7. Loss of birdlife

- Favour the use of nets, home-made sound equipment, scarecrows and guards to fight against grain-eating birds rather than chemicals ;
- Use registered bird control products
- Develop varieties that are less attacked by birds⁶ ;
- Report any banded migratory birds found dead or injured in irrigated perimeters.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: See **costs of** vegetation degradation in the preparatory phase.

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.3.1.8. Mosquito proliferation

- Fight against mosquito habitats in and around houses: boxes, empty cans or any object that can contain water and shelter mosquito larvae;
- Raise awareness about hygiene and health.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control:

ANGE **Costs:** PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.3.1.9. Stripping of the landscape

- Always protect gallery forests and trees that have been spared within the irrigated perimeters;
- Maintain the trees planted as part of compensatory reforestation around the irrigated perimeters.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control:

ANGE **Costs:** PM

⁶ For example, NERICA (New Rice for Africa) 1, 2, 4, 7, 8, 11 (rainfed rice varieties) and NERICA L14, L19, L20 (swamp rice varieties).

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.3.1.10. Acceleration of wind speed on the ground

- Maintain and protect windbreak trees planted in the direction of the prevailing winds on the project perimeters;
- Always protect gallery forests and trees that have been spared within the irrigated perimeters;
- Maintain the trees planted as part of compensatory reforestation around the irrigated perimeters.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control:

ANGE Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.3.1.11. Air pollution through methane emissions

- Train and sensitize farmers in irrigated perimeters to the Intensive Rice Growing System (IRS).
- Involve structures such as ITRA, ICAT, the NGOs ETD and GRAPHE in the implementation of an awareness and technical support programme for the development of SRI practice.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control:

ANGE Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.3.2. MEASURES TO MITIGATE NEGATIVE IMPACTS ON THE HUMAN ENVIRONMENT

2.3.2.1. Damage to the animals by wandering and transhumance in the perimeters

- Deposit rice harvest residues outside the perimeters;
- Set up a Programme for the Integration of Livestock into Agriculture ;
- In collaboration with the population and the transhumant herdsmen, set up corridors outside the agropole zone and ensure that the transhumant herdsmen scrupulously respect these corridors;
- Severely punish the herdsmen and transhumants who violate the law;
- Promote animal husbandry in enclosures with the use of rice harvest residues;
- Establish conflict resolution between farmers and herders.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.3.2.2. Damage to the health of the population due to the development of water-borne diseases.

2.3.2.2.1. Malaria development

- Raise awareness about hygiene and health,
- Fight against mosquito habitats in and around houses: boxes, empty jerry cans or any object that can contain water and shelter malaria vectors;
- Subsidize the purchase of impregnated mosquito nets for the populations in the project area or establish a link with the Ministry of Health to include the project area in the LLIN Programme for the free distribution of mosquito nets;
- Assisting the health centres of Broukou and Léon wit h generic anti-malaria drugs and other measures

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of risk

Nature	Interaction	Duration	Scope	Intensity	Residual risk	Occurrence	Reversibility
Negative	Direct	Long	Punctual	Low	Minor	Probable	Irreversible

The significance of the residual risk is minor.

2.3.2.2.2. Development of bilharzia

- Do not stay in the stagnant water of the irrigated areas for long periods of time and too regularly, especially for children;
- Protect water from contamination by urine and excrement of humans and animals;
- Raise awareness among the population (especially children) so that they do not bathe in the stagnant water of the irrigated perimeters;
- Do not use pesticides against gastropods because of the enormous toxicity of these inputs ;
- To provide the health centres of Broukou and Léon with medicines for the treatment of bilharziasis.

2.4. MEASURES TO MITIGATE NEGATIVE IMPACTS AT THE END OF THE PROJECT PHASE

2.4.1. SCENARIO 1: CASE OF DISPOSAL

2.4.1.1. Mitigation measures for impacts on the biophysical environment

2.4.1.1.1. Modification of soil structure

- Do not overwater to prevent leaching of nutrients from the soil;
- Adopt the Intensive Rice System (IRS), which consumes little water and chemical fertiliser but is highly productive per hectare.
- Alternate crops to allow nutrients to replenish ;
- Incorporate organic manure into soil improvers;
- Favour biological control for soil maintenance and improvement over chemical control⁷
- Significantly reduce the quantities of inputs usually used ;
- Encourage the use of registered pesticides for the benefit of all (non-registered) vendors;
- To associate structures such as ITRA, ICAT and the NGO GRAPHE in the implementation of an awareness and technical support programme for the development of the practice of the Intensive Rice Growing System (IRS).

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

⁷ See the experience of the NGO AGIDE, which has developed fungus-based fertilisers and pesticides called **CHAMPIGROW** to restore soil fertility and crop health.

2.4.1.1.2. Salinisation, alkalisation and alkalinisation of soils

- Adjust the flow of water applied to the land, to avoid over-watering (including a device to cut off the water supply to the irrigation channels) and waterlogging;
- Establish and maintain an appropriate perimeter drainage system;
- Monitoring soil salinity and alkalinity as part of the research and development support programme;
- To set up an awareness and technical support programme for the development of appropriate water and crop management practices that promote the drainage of plots after rice cultivation.
- Raising awareness among farmers and insisting on a considerable reduction in the quantities of inputs usually used
- Encouraging the use of registered pesticides for the benefit of all (unregistered) vendors
- Favour biological control for soil maintenance and improvement over chemical control⁸
- Adopt the System of Intensive Rice Growing (SRI), which consumes little water and chemical fertiliser but is highly productive per hectare.
- Monitoring soil salinity and alkalinity as part of the research and development support programme;
- To associate structures such as ITRA, ICAT and the NGO GRAPHE in the implementation of an awareness and technical support programme for the development of the practice of the Intensive Rice Growing System (IRS).

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.1.1.3. Degradation of soil physico-chemical parameters

- Implement the same measures as those applied to salinisation, alkalisation and alkalinisation of soils

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

⁸ Ditto

2.4.1.1.4. Soil pollution by solid plant waste

- Deposit rice harvest residues outside the perimeters for livestock;
- Initiate projects to transform rice residues into cooking charcoal for households and compost for the manufacture of organic fertiliser⁹
- Separate crop residues from input packaging (empty cans and bags, etc.).
- Collect all input bags, packaging and cans and see how much of them can be reused;
- Carefully destroy all sachets, packaging and drums of contaminated inputs (see risk of contamination of populations).

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.1.1.5. Loss of terrestrial vegetation

- Maintain the seedlings planted during the development of the project's perimeters;
- Protect gallery forests and plant cover that would not interfere with ploughing in the perimeters.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: See costs of vegetation degradation in the preparatory phase.

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.1.2. Loss of terrestrial wildlife

- Maintain the seedlings planted during the project;
- Protect gallery forests and plant cover that does not interfere with ploughing in the perimeters;
- Use registered pest and weed control products in irrigated perimeters.

⁹ See the experience of the NGO AGIDE (Tsévié, Kara)

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: See **costs of** vegetation degradation in the preparatory phase.

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.1.3. Loss of birdlife

- Favour the use of nets, home-made sound equipment, scarecrows and guards to fight against grain-eating birds rather than chemicals ;
- Use registered bird control products
- Develop varieties that are less attacked by birds¹⁰ ;
- Report any banded migratory birds found dead or injured in irrigated perimeters.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: See **costs of** vegetation degradation in the preparatory phase.

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.1.4. Mosquito proliferation

- Fight against mosquito habitats in and around houses: boxes, empty cans or any object that can contain water and shelter mosquito larvae;
- Raise awareness about hygiene and health.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control:

ANGE **Costs:** PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

¹⁰ For example, NERICA (New Rice for Africa) 1, 2, 4, 7, 8, 11 (rainfed rice varieties) and NERICA L14, L19, L20 (swamp rice varieties).

2.4.1.5. Stripping of the landscape

- Always protect gallery forests and trees that have been spared within the irrigated perimeters;
- Maintain the trees planted as part of compensatory reforestation around the irrigated perimeters.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.1.6. Acceleration of wind speed on the ground

- Always protect gallery forests and trees that have been spared within the irrigated perimeters;
- Maintain the trees planted as part of compensatory reforestation around the irrigated perimeters.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.1.7. Air pollution through methane emissions

- Train and sensitize farmers in irrigated perimeters to the Intensive Rice Growing System (IRS).
- Involve structures such as ITRA, ICAT, the NGOs ETD and GRAPHE in the implementation of an awareness and technical support programme for the development of SRI practice.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.1.8. Mitigation measures for impacts on the human environment

2.4.1.8.1. Damage to the animals by wandering and transhumance in the perimeters

- Deposit rice harvest residues outside the perimeters;
- Set up a Programme for the Integration of Livestock into Agriculture ;
- In collaboration with the population and the transhumant herdsman, set up corridors outside the agropole zone and ensure that the transhumant herdsman scrupulously respect these corridors;
- Severely punish the herdsman and transhumants who violate the law;
- Promote animal husbandry in enclosures with the use of rice harvest residues;
- Establish conflict resolution between farmers and herders.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.1.8.2. Damage to the health of the population due to the development of water-borne diseases.

A) Malaria development

- Raise awareness about hygiene and health,
- Fight against mosquito habitats in and around houses: boxes, empty jerry cans or any object that can contain water and shelter malaria vectors;
- Subsidize the purchase of impregnated mosquito nets for the populations in the project area or establish a link with the Ministry of Health to include the project area in the LLIN Programme for the free distribution of mosquito nets;
- Assisting the health centres of Broukou and Léon with generic anti-malaria drugs and other measures

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of risk

Nature	Interaction	Duration	Scope	Intensity	Residual risk	Occurrence	Reversibility
Negative	Direct	Long	Punctual	Low	Minor	Probable	Irreversible

The significance of the residual risk is minor.

B) Development of bilharzia

- Do not stay in the stagnant water of the irrigated areas for long periods of time and too regularly, especially for children;
- Protect water from contamination by urine and excrement of humans and animals;
- Raise awareness among the population (especially children) so that they do not bathe in the stagnant water of the irrigated perimeters;
- Do not use pesticides against gastropods because of the enormous toxicity of these inputs ;
- To provide the health centres of Broukou and Léon with medicines for the treatment of bilharziasis.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.2. SCENARIO 2: CASE OF DISMANTLING

2.4.2.1. Mitigation measures for impacts on the biophysical environment

2.4.2.1.1. Soil pollution by solid waste

- to install the dustbins and to put in it in a systematic way all the solid waste of the building site;
- dispose of solid waste at an approved landfill site;
- remove rubble and other debris to the approved landfill.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.2.1.2. Air pollution

- Comply with WHO air quality guidelines;
- Regularly maintain vehicles and machinery and check the quality of engines to avoid excessive gas emissions;
- Prohibit the burning of waste on the building site.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.2.1.3. Water pollution

- Comply with WHO guidelines for wastewater discharge
- Avoid the maintenance of vehicles on the worksite
- Avoid contact of hydrocarbons with water
- Use vehicles in good condition

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.2.1.4. Noise emission and nuisance

- Comply with noise emission limits ;
- Prohibit drivers of vehicles and construction equipment from leaving engines running unnecessarily;
- Checking the noise level of vehicles, machines and construction tools;
- Carry out the work only during authorised regular business hours.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control:

ANGE **Costs:** PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.2.2. Mitigation measures for impacts on the human environment

2.4.2.2.1. Reduction in agricultural production

- Study the possibility of new hydro-agricultural developments. To this end, the promoter will have to undertake the same procedures with regard to the Environmental and Social Impact Assessment, namely:
 - Submission of the project notice
 - Transmission of guides or guidance documents
 - Preparation of ToRs
 - Site visit
 - Validation of ToRs
 - Completion and submission of the draft ESIA report
 - Notification of the admissibility of the provisional report
 - Notification of cost and dates of evaluation workshops
 - Public participation
 - Technical assessment of the report
 - Evaluation of the draft report in the workshop
 - Transmission of the final report for verification and acceptance
 - Issuance of the environmental compliance certificate
 - Implementation and control of the ESMP

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.2.2.2. Loss of fishing activities

- Study the possibility of rebuilding new hydro-agricultural facilities;
- Undertake the same procedures for the elaboration of the Environmental and Social Impact Assessment (ESIA).

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.2.2.3. Loss of income and impoverishment

- Study the possibility of rebuilding new hydro-agricultural facilities;
- Undertake the same procedures for the elaboration of the Environmental and Social Impact Assessment (ESIA).

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.3. SCENARIO 3: CASE OF ABANDONMENT

2.4.3.1. Mitigation measures for impacts on the biophysical environment

No negative impact was identified on the biophysical environment during the project abandonment phase.

2.4.3.2. Mitigation measures for impacts on the human environment

2.4.3.2.1. Decrease in agricultural and market gardening activities

- Study the possibility of rebuilding new hydro-agricultural facilities;
- Undertake the same procedures for the elaboration of the Study. Environmental and Social Impact Assessment (ESIA).

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.3.2.2. Reduction of commercial activities related to irrigated agriculture and income-generating activities

- Study the possibility of rebuilding new hydro-agricultural facilities;
- Undertake the same procedures for the elaboration of the Study. Environmental and Social Impact Assessment (ESIA).

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.3.2.3. Dislocation of the socio-economic structure

- Study the possibility of rebuilding new hydro-agricultural facilities;
- Undertake the same procedures for the elaboration of the Study. Environmental and Social Impact Assessment (ESIA).

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.3.2.4. Drop in the economic penetration of the zone

- Study the possibility of rebuilding new hydro-agricultural facilities;
- Undertake the same procedures for the elaboration of the Study. Environmental and Social Impact Assessment (ESIA).

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE **Costs:** PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.3.2.5. Deterioration of social relations and the devaluation of the local rural economy

- Study the possibility of rebuilding new hydro-agricultural facilities;
- Undertake the same procedures for the elaboration of the Study. Environmental and Social Impact Assessment (ESIA).

Probability of success of mitigation measure: Medium
Responsible for implementation: Promoter **Responsible for monitoring and control:** ANGE **Costs:** PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.3.2.6. General deterioration in the quality of life of farmers

- Study the possibility of rebuilding new hydro-agricultural facilities;
- Undertake the same procedures for the elaboration of the Study. Environmental and Social Impact Assessment (ESIA).

Probability of success of mitigation measure: Medium
Responsible for implementation: Promoter
Responsible for monitoring and control: ANGE
Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.3.2.7. Deterioration of the living environment and the social well-being of the population

- Study the possibility of rebuilding new hydro-agricultural facilities;
- Undertake the same procedures for the elaboration of the Study. Environmental and Social Impact Assessment (ESIA).

Probability of success of mitigation measure: Medium
Responsible for implementation: Promoter
Responsible for monitoring and control: ANGE
Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

2.4.3.2.8. Decline in the socio-economic trajectory of young people and the resumption of the rural exodus

- Study the possibility of rebuilding new hydro-agricultural facilities;
- Undertake the same procedures for the elaboration of the Study. Environmental and Social Impact Assessment (ESIA).

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: PM

Evaluation of the new value of the impact (Residual Impact)

Nature	Interaction	Duration	Scope	Intensity	Residual impact	Probability of occurrence
Negative	Direct	Short	Local	Low	Minor	Likely and low

The significance of the residual impact is minor. It does not require any compensatory measures

3- RISK ANALYSIS AND MANAGEMENT

3.1. **DESCRIPTION AND EVALUATION OF RISKS IN THE PREPARATORY AND CONSTRUCTION PHASES**

3.1.1. **IN TERMS OF BIOPHYSICAL ASPECTS**

3.1.1.1. **Risk of soil pollution by liquid waste**

The use and parking of machinery and trucks on the site during the preparatory phase and during the work can lead to dripping motor oil and hydrocarbons that can lead to soil pollution.

Risk assessment

Probability (P)						
Frequent	5		25			
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 25. This risk is therefore unacceptable and requires special preventive measures.

3.1.1.2. **Risk of pollution of surface water by liquid waste**

As the work has to be carried out at river level, river water can be polluted by dripping motor oil, hydrocarbons and other oils, including lubricants used by the various machines and trucks in operation during the preparatory and construction phases. Surface water can also be polluted by waste water from the living base and defecation in nature by the workers of the construction company.

Risk assessment

Probability (P)						
Frequent	5		25			
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 25. This risk is therefore unacceptable and requires special preventive measures.

3.1.2. **AT THE LEVEL OF THE HUMAN ASPECTS**

3.1.2.1. **Risk of disruption of customs and sexual deviance**

The presence of foreign site personnel, other than the local population, can encourage negative cultural mixing such as the depravity of morals, the peddling of new behaviours and the creation of new needs incompatible with the socio-economic and cultural realities of the project's receiving environment. All this will be at the root of negative externalities such as self-serving sexual relations, the development of prostitution and adultery, and unwanted pregnancies.

Risk assessment

Probability (P)	
-----------------	--

Frequent	5			35		
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 35. This risk is therefore unacceptable and requires special preventive measures.

3.1.2.2. Risk of travel accident

Workers on construction sites, especially staff and labourers, can be victims of commuting accidents when they come to work in the mornings or when they return home at the end of the working day.

Risk assessment

Probability (P)						
Frequent	5					
Uncommon	4		24			
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 24. This risk is therefore unacceptable and requires special preventive measures.

3.1.2.3. Risk of work accidents on the construction site

Workers on construction sites can be victims of accidents at work. These accidents could be in the form of physical injuries from tripping and falling to the ground, cuts from sharp objects, muscle tears or aches and pains from lifting very heavy objects off the ground.

Risk assessment

Probability (P)						
Frequent	5		25			
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 25. This risk is therefore unacceptable and requires special preventive measures.

3.1.2.4. Risk of traffic accidents

The circulation of lorries and machinery on the construction site and the transport of construction materials (lateritic gravel, sand, gravel, cement, concrete iron, etc.) to the development sites of the irrigated perimeters will increase the traffic on the routes used by the said vehicles. This could lead to traffic accidents.

Risk assessment

Probability (P)						
Frequent	5		25			
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 25. This risk is therefore unacceptable and requires special preventive measures.

3.1.2.5. Risk to the health of workers on the construction site

The various nuisances to which workers and staff of the enterprises will be exposed, including inhalation of dust, gas, foul odours and exposure to noise and vibrations, etc., could be harmful to their health, including physical pain, hearing impairment, respiratory and skin diseases, etc.

Risk assessment

Probability (P)						
Frequent	5					
Uncommon	4		24			
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 24. This risk is therefore unacceptable and requires special preventive measures.

3.1.2.6. Risk of contamination and spread of sexually transmitted infections

Local people's contact with employees from other walks of life and unprotected sex can be a source of risk for infection and the spread of STIs, including HIV/AIDS.

Risk assessment

Probability (P)						
Frequent	5			35		
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 35. This risk is therefore unacceptable and requires special preventive measures.

3.1.2.7. Risk of contamination and spread of coronavirus infections

The contact of the local population with the company's workers from other areas can be a source of risk of contamination and spread of the coronavirus.

Risk assessment

Probability (P)						
Frequent	5			35		
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 35. This risk is therefore unacceptable and requires special preventive measures.

3.2. DESCRIPTION AND EVALUATION OF RISKS IN THE OPERATIONAL PHASE

3.2.1. IN TERMS OF BIOPHYSICAL ASPECTS

3.2.1.1. Risk of soil pollution by hazardous solid waste

At the exploitation phase, the hazardous solid waste that could pollute the soil are the empty pesticide containers. These empty pesticide containers left by farmers after using the contents could litter the soil and pollute it.

Risk assessment

Probability (P)						
Frequent	5			35		
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 35. This risk is therefore unacceptable and requires special preventive measures.

3.2.1.2. Risk of soil pollution from hazardous liquid discharges

Hazardous liquid discharges that could pollute the soil are the uncontrolled disposal of insecticide suspensions in nature after their preparation and use.

Risk assessment

Probability (P)						
Frequent	5			35		
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 35. This risk is therefore unacceptable and requires special preventive measures.

3.2.1.3. Risk of surface water pollution

During the exploitation phase, the risk of surface water pollution may be linked to liquid or solid polluting discharges from the irrigated perimeter traps. The use of agricultural inputs such as pesticides, fertilisers and herbicides will thus contribute to the pollution of surface and ground water.

Risk assessment

Probability (P)						
Frequent	5			35		
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 35. This risk is therefore unacceptable and requires special preventive measures.

3.2.1.4. Risk of pollution and groundwater contamination

It has been identified as a positive impact of the presence of the irrigated perimeters "Groundwater supply" in water. However, groundwater can be polluted by the infiltration of polluted irrigation water and suffer contamination from impurities such as nitrates, phosphates, ammonium.

Risk assessment

Probability (P)						
Frequent	5			35		
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 35. This risk is therefore unacceptable and requires special preventive measures.

3.2.2. AT THE LEVEL OF THE HUMAN ASPECTS

3.2.2.1. Risk of damage to the health of the population

In the exploitation phase, health risks may come from two different, but not exclusive, sources for all individuals: those related to the use of surface water and those related to living in a village near irrigated perimeters.

In the exploitation phase, health risks may come from two different, but not exclusive, sources for all individuals: those related to the use of surface water and those related to living in a village near irrigated perimeters.

The presence of irrigated perimeters could well make the situation even worse. Indeed, as malaria is the main cause of consultations in the area, and therefore the first health problem, the irrigated perimeters will constitute additional risks for this disease. With catchment, drainage and irrigation schemes, the sources of malaria germ production will be increased as these schemes are still without protective cover. This will then increase malaria morbidity.

Bilharzia can also affect the population, especially the operators of irrigated pre-metres. The development of bilharziasis is linked to the permanent presence of farmers in the water. The resulting pathologies are urinary or intestinal bilharziasis linked to the use of polluted water from irrigation and drainage networks in irrigated perimeters, for washing, bathing and water supply.

Risk assessment

Probability (P)						
Frequent	5			35		
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 35. This risk is therefore unacceptable and requires special preventive measures.

3.2.2.2. Farmers' risk of accidents at work in the agricultural sector. **farms**

At the time of the exploitation of the irrigated perimeters, there could be accidents at work at the level of the farmers. These may be falls on the ground, cuts by agricultural implements (hoes, cutters, ploughs attached to oxen or tractors, etc.), or accidents caused by the use of a tractor.

Risk assessment

Probability (P)						
Frequent	5		25			
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 25. This risk is therefore unacceptable and requires special preventive measures.

3.2.2.3. Risk of poisoning for farmers and the population

On rice farms, farmers could be poisoned by the uncontrolled use of plant protection products on the farm. Indeed, village structures and farmers do not have appropriate shops for storing pesticides. At the level of the populations, the storage system is not compliant. Indeed, it can happen that products are stored in a corner of the house, in unidentified containers with all the risks inherent to this practice, particularly the use for food purposes by children and adults.

When an organism is exposed to a pesticide, an effect occurs which is a manifestation of the toxicity of the pesticide. This effect can be acute, sub-chronic or chronic. It is important to remember that: toxicants produce effects in the body from the moment they are absorbed, mainly in the skin, digestive tract and lungs; the effects of toxic products on the body are related to their concentration in the target organs.

The intrinsic hazards of each pesticide were based on five toxicity measurements representing different risk factors:

- Acute oral toxicity for rats: general risk of intoxication for humans ;
- Acute dermal toxicity for rats: occupational risk for pesticide operators (professional applicators, farmers);
- Acute contact toxicity for bees: risk to bees, crop pollination and honey production.

The foreseeable risks are linked to the following stages: storage of the products; handling; transport; dosage during treatments, particularly contamination of field agents (applicators) who could be exposed to the effects of pesticides if the instructions relating to the standards of use of the products are not sufficiently applied; use of pastures immediately after their treatment, if the populations are not sufficiently informed and involved in preventive control.

Risk assessment

Probability (P)						
Frequent	5					
Uncommon	4			34		
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 34. This risk is therefore unacceptable and requires special preventive measures.

3.3. DESCRIPTION AND ASSESSMENT OF RISKS AT THE END OF THE PROJECT PHASE

3.3.1. SCENARIO 1: CASE OF DISPOSAL

3.3.1.1. Description and evaluation of risks on the biophysical environment

At the end of the project and in the event of disposal, the risks associated with the project in the operating phase will still be proven. These are the risks of soil pollution by hazardous solid waste, soil pollution by hazardous liquid discharges, surface water pollution and groundwater pollution and contamination.

Risk assessment

Probability (P)						
Frequent	5			35		
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 35. This risk is therefore unacceptable and requires special preventive measures.

3.3.1.2. Description and evaluation of risks on the human environment

On the human environment as well, the same risks mentioned during the exploitation phase will be proven at the end of the project. These are the risk of occupational accidents for farmers on the farms and the risk of poisoning for farmers and the population.

Risk assessment

Probability (P)						
Frequent	5			35		
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 35. This risk is therefore unacceptable and requires special preventive measures.

3.3.2. SCENARIO 2: CASE OF DISMANTLING

3.3.2.1. Description and evaluation of risks on the biophysical environment

3.3.2.1.1. Risk of soil pollution by liquid waste

The operation of construction machinery and trucks transporting demolition materials and equipment dismantled on site could lead to soil pollution through leaks or dripping motor oil onto the ground.

Risk assessment

Probability (P)						
Frequent	5	15				
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is minor. The PxG indicator of the risk is 15. This risk is therefore unacceptable and requires special preventive measures.

3.3.2.1.2. Risk of water pollution

Drainage and other oil and hydrocarbon leaks from construction machinery on the ground and rubble during demolition may pollute surface water through the run-off process if the work is diverted during rainy weather.

Risk assessment

Probability (P)						
Frequent	5		25			
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is minor. The PxG indicator of the risk is 25. This risk is therefore unacceptable and requires special preventive measures.

3.3.2.2. Description and evaluation of risks on the human environment

3.3.2.2.1. Risk of traffic accidents

The transport of demolition materials and dismantled equipment as well as the movement of machinery could cause traffic accidents.

Risk assessment

Probability (P)						
Frequent	5		25			
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 25. This risk is therefore unacceptable and requires special preventive measures.

3.3.2.2.2. Risk of travel accidents

Workers on construction sites, especially staff and labourers, can be victims of commuting accidents when coming to work in the mornings or returning home at the end of the working day.

Risk assessment

Probability (P)						
Frequent	5					
Uncommon	4		24			
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 24. This risk is therefore unacceptable and requires special preventive measures.

3.3.2.2.3. Risks to the safety of the company's personnel during the works

The demolition of aquaculture structures and land-based infrastructure may result in occupational accidents to workers. These include physical injuries from tripping over objects on the ground, cuts from sharp objects and sprains from falling on the ground.

Risk assessment

Probability (P)						
Frequent	5		25			
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 25. This risk is therefore unacceptable and requires special preventive measures.

3.3.2.2.4. Risk of damage to the health of the company's personnel working on the sites

The various nuisances to which the company's personnel will be exposed could be detrimental to their health, including: hearing impairment, Acute Respiratory Infections (ARIs), aches and pains in muscles, etc.

Risk assessment

Probability (P)						
Frequent	5		25			
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 25. This risk is therefore unacceptable and requires special preventive measures.

3.3.2.2.5. Risk of contamination and spread of sexually transmitted infections and coronavirus

Local people's contact with demolition company employees and unprotected sex can be a source of risk for infection and the spread of STIs, including HIV/AIDS and coronavirus.

Risk assessment

Probability (P)						
Frequent	5		25			
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 25. This risk is therefore unacceptable and requires special preventive measures.

3.3.3. SCENARIO 3: CASE OF ABANDONMENT

3.3.3.1. Description and evaluation of risks on the biophysical environment

At the end of the project and in the event of abandonment, the risks linked to the project in the exploitation phase will still be proven, perhaps even with a certain and strong probability of occurrence, because no control and technical follow-up can be carried out at the level of the farmers who would continue to work in the irrigated perimeters, with regard to the use of agricultural inputs. These are the risks of soil pollution by hazardous solid waste, soil pollution by hazardous liquid discharges, surface water pollution and groundwater pollution and contamination.

Risk assessment

Probability (P)						
Frequent	5			35		
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 35. This risk is therefore unacceptable and requires special preventive measures.

3.3.3.2. Description and evaluation of risks on the human environment

In the human environment too, the same risks mentioned during the exploitation phase will be revealed at the end of the project in the event of abandonment, with a strong and certain probability of occurrence, because no control and technical monitoring can be carried out on the farmers who would continue to work in the irrigated perimeters. This concerns the risk of occupational accidents for farmers on the farms and the risk of intoxication for farmers and the population.

Risk assessment

Probability (P)						
Frequent	5			35		
Uncommon	4					
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of the risk is frequent and its severity is significant. The PxG indicator of the risk is 35. This risk is therefore unacceptable and requires special preventive measures.

3.4. PROPOSAL OF RISK MANAGEMENT MEASURES IN THE PREPARATORY AND CONSTRUCTION PHASES

3.4.1. IN TERMS OF BIOPHYSICAL ASPECTS

3.4.1.1. Risk of soil pollution by liquid waste

- Raise awareness among employees about the harmful effects of soil pollution by waste oils, particularly used oil and hydrocarbons;
- Do not spill waste oil, hydrocarbons and grease on the ground;
- Carry out vehicle emptying operations on a waterproof platform;
- Collect waste oil in leak-proof containers and send it to approved treatment companies;
- Waterproofing the platforms where generators, fuel depots and hydrocarbon refuelling stations are installed and draining them to a de-oiling system for pollution abatement;
- Drain run-off from concrete platforms to a settling pond where the pH is buffered ;
- List, locate and characterise the flow, the expected quality, the frequency of discharge of all sources of effluent and the points of outlet into the natural environment;
- Provide washrooms on the job site for workers.

Probability of success of the preventive measure:

Average Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: Included in the contract for the works company

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.4.1.2. Risk of surface water pollution

- Raise awareness among employees about the harmful effects of water pollution by waste oils, particularly used oil and hydrocarbons;
- Do not allow oil, grease and oil change to come into contact with run-off water;
- Carry out vehicle oil change operations on watertight supports and entrust used oil to approved treatment companies;
- Drain water run-off to a de-oiling device for pollution abatement and to a settling tank where the pH is buffered.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs: Included in the contract for the works company

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.4.2. AT THE LEVEL OF THE HUMAN ASPECTS

3.4.2.1. Risk of disruption of customs and sexual deviance

- Sensitize the foreign workforce on the customs and habits of the localities in the project area;
- Sanction staff members who violate local customs and traditions;
- Dismissing repeat offenders who have committed irresponsible acts that could damage the social harmony between the local population, the construction company and APRODAT;
- Raise awareness among the populations of the neighbourhoods concerned by the project, especially women and girls, about the risks of changing behaviour with the negative externalities linked to the lure of easy profits.

Probability of success of mitigation measure: Medium

Responsible for implementation: Promoter

Responsible for monitoring and control: ANGE

Costs: See cost of the risk of contamination and spread of sexually transmitted infections.

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.4.2.2. Risk of travel accident

- Provide and make available to workers a vehicle to shuttle and transport workers from an assembly point to the work sites;
- Raising workers' awareness of commuting accidents ;
- Insist on the vigilance of workers as they leave the building sites and on their journey from home to the building sites and vice versa;
- Do not take detours when leaving home for construction sites or when returning home at the end of the working day;
- Notify your supervisor when you have to make unintentional detours.

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.4.2.3. Risk of work accidents on the construction site

- Take out an all-risk insurance policy, covering workers on building sites;
- Equip employees with suitable personal protective equipment (PPE) and ensure that it is worn;
- Putting in place first aid equipment ;
- Training staff in first aid;
- Setting up an ambulance for the transfer of serious accidents to the nearest hospital;
- Mark danger areas with signs and markers ;
- Sign an agreement for the rapid handling of accidents at the CHU or the CHR of Kara;
- Arrange for an ambulance to evacuate serious cases.

Table 13 presents examples of occupational hazards and types of personal protective equipment available for different applications.

Table 13: Summary of recommended personal protective equipment according to risks

Objective	Workplace risks	Recommended personal protective equipment
Eye and face protection	Flying particles, molten metal, molten chemicals, gases or vapours, light radiation	Safety glasses with side shields
Head protection	Falling objects, insufficient headroom, and overhead power cables	Plastic helmets with top and side protection
Hearing protection	Noise, ultrasound	Hearing protection (earmuffs, earmuffs, earmuffs, etc.)
Foot protection	Falling or rolling objects; sharp objects, corrosive or hot liquids	Safety shoes and boots for protection against falling or moving objects, liquids and chemicals
Hand protection	Hazardous materials, cuts or lacerations; vibrations; extreme temperatures	Rubber or synthetic (neoprene) gloves; leather, steel, insulating material
Breathing protection	Dust, vapours, fumes, mists, gases, smoke	Masks equipped with appropriate filters for the removal of dust (European Union EN 140 protection standards, i.e. a filtering of FFP1 to FFP2 corresponding respectively to 4 times the VME and 10 times the VME) and air purification (chemicals, mists, vapours and gases - European Union EN 140 protection standards, i.e. a class 2 gas/vapour filter corresponding to a filtering of pollutant concentration < 0.5% or 5,000 ppm-). Dosimeters Single or multiple gas single or multiple, as appropriate

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter Responsible

for monitoring and control: ANGE

Costs: 15 000 000 F CFA

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.4.2.4. Risk of traffic accidents

- Take out an insurance policy for construction sites and covering workers ;
- Putting up temporary traffic signs ;
- Raise awareness of road safety among workers and the local population;
- Regulate traffic (speed limit) when crossing populated areas;
- Daily check that the braking system and the reverse warning system of vehicles and construction machinery are in good working order;
- Raise truck drivers' awareness of compliance with the Highway Code and the company's internal regulations;
- Prohibit public access to construction sites ;
- Provide first aid equipment
- Train workers in first aid.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs: Included in the contract for the works company

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.4.2.5. Risk to the health of workers on the construction site

- Raise workers' awareness about hygiene and health on the construction site ;
- Equipping employees with suitable PPE and ensuring that it is worn;
- To set up a functional care centre ;
- Training staff in first aid;
- Mark danger areas with signs and markers.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs: See **costs** of measures against the risk of accidents at work.

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.4.2.6. Risk of contamination and spread of sexually transmitted infections

- Carry out, through a qualified entity, an STI/HIV/AIDS risk awareness program that will include all necessary measures to reduce the risk of the spread of STI/HIV/AIDS among workers as well as local populations.

To do so, it would be necessary during the construction period :

- conduct information, education and communication campaigns at least every two months for workers on construction sites and for the local population on the risks, dangers, consequences and appropriate preventive behaviour concerning sexually transmitted infections (STIs) in general and HIV/AIDS in particular;
- Provide male and female condoms to all staff and labourers on the sites
- Conducting screening and diagnostic tests and providing access to consultations organised under the aegis of the national programme dedicated to the fight against HIV/AIDS for all personnel and workers working on construction sites.
- Assist any person declared HIV-positive by referring him/her to a specialised care centre.

Table 14 presents the plan for raising public awareness of the risk of infection and the spread of STIs, including HIV/AIDS.

Table 14: Plan of awareness campaign on STI/HIV/AIDS

Locations concerned	Actions to be carried out by campaign and by locality
<ul style="list-style-type: none"> - Broukou - Misséouta - Bidjandè - Kpasssidè - Léon 	<ul style="list-style-type: none"> - Contact with the persons in charge of the structures by locality ; - Debate session on STI/HIV/AIDS (knowledge on STI/HIV/AIDS, modes of transmission, methods of transmission, etc.). prevention, modes of access to treatment, costs, etc.) ; - Video session on STI/HIV/AIDS and free distribution of condoms to participants ; - Voluntary HIV/AIDS testing.

Probability of success of the preventive measure : Medium
Responsible for implementation : Promoter
Responsible for monitoring and control : ANGE
Costs : 8 000 000 F CFA11

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.4.2.6.1. Risk of contamination and propagation of coronavirus infections

- Conduct awareness-raising sessions on prevention and the campaign against the pandemic, with the aim of raising awareness of possible risks and ensuring that employees take both precautionary and preventive measures seriously;
- Organize site activities to avoid the junction of sub-sites and the excessive concentration of workers in one place, thus reducing the risk of possible internal infection;
- Set up a functional hand washing device at the entrance to the base with an agent assigned to the operation of this device;
- Take the temperature of the forehead at the beginning and end of the day for all employees;
- Reinforce the control in front of the entrance gate of the base-life and construction site where the thermometer is used to take the forehead temperature of visitors and employees.

Likelihood of success of the preventive measure: Medium
Responsible for implementation : Promoter
Responsible for monitoring : ANGE
Cost : 5 000 000 F CFA

¹¹ 2,000,000 CFA francs for each of the localities. For information and awareness campaigns on STIs and HIV/AIDS (meetings including per diem and travel + posters and/or banners, brochures, purchase of condoms), at the rate of one campaign one month before the start of the works (by the promoter or the company or an NGO), one campaign at the time of site installation and a series of campaigns every three months during the works by the company).

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.5. PROPOSAL OF RISK MANAGEMENT MEASURES AT THE OPERATING PHASE

3.5.1. IN TERMS OF BIOPHYSICAL ASPECTS

3.5.1.1. Risk of soil pollution by hazardous solid waste

- Raising farmers' awareness of the harmful effects of empty insecticide containers
- Collecting empty containers and managing them in an environmentally friendly way through decontamination.
- To train the population in the ecological management and reuse of decontaminated containers.
- Burn previously cleaned cardboard, paper or plastic packaging or containers at a safe distance from homes and drinking water sources.
- Bury all containers, cans, bottles etc. that have contained pesticides;
- Fill the hole as quickly as possible.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs: PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.5.1.2. Risk of soil pollution from hazardous liquid discharges

- Do not pour the rest of the insecticide suspension directly onto the ground.
- Safely dispose of the insecticide suspension by pouring it into a specially dug hole or pit latrine after the operations;
- Pour all water used for hand washing after treatment into a dugout at least 100 metres from any watercourse, well or dwelling ;

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.5.1.3. Risk of surface water pollution

- Do not dispose of a pesticide by throwing it in a place where it may contaminate water used for drinking or washing or reach a watercourse. Some insecticides, such as pyrethroids, are highly toxic to fish ;
- Monitoring soil salinity and alkalinity as part of the research and development support programme;
- To set up an awareness and technical support programme to develop appropriate water and crop management practices that promote the drainage of plots after rice cultivation;
- Periodically wash the land with abundant irrigation, followed by systematic drainage to dilute the salts;
- Periodically analyse the water of the rivers upstream and downstream of the irrigated perimeters.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.5.1.4. Risk of pollution and groundwater contamination

- Periodically analyse the quality of water from boreholes and control wells in the irrigated perimeters.
- Setting up a drinking water supply system in the localities of the irrigated perimeters
- Raise awareness of the need to avoid the frequent use of surface water for drinking.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.5.2. AT THE LEVEL OF THE HUMAN ASPECTS

3.5.2.1. Risk of damage to the health of the population

- To implement, in general, Information, Education and Communication (IEC) programmes on water and malaria diseases and hygiene measures;
- To draw up and implement a socio-educational and sanitary programme and a Plan for the control and monitoring of pathologies linked to the presence of water on a permanent basis in the project area.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.5.2.2. Farmers' risk of occupational accidents in the agricultural sector. farms

- Train and raise awareness among farmers on the risks of accidents in irrigated areas;
- Train and raise awareness among farmers in the use of farming tools, including ploughs and other equipment that can cause accidents on farms;
- Raise awareness among farmers to have a medical kit for minor injuries.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.5.2.3. Risk of poisoning for farmers and the population

3.5.2.3.1. At the level of packaging labelling

- Packaging and labelling of pesticides in accordance with WHO standards. The label must be written in French, with pictograms; it must indicate the contents, the safety instructions (warning) and any measures to be taken in case of accidental ingestion or contamination;
- Always leave the product in its original container.

3.5.2.3.2. In terms of storage and transport

- Keep pesticides in appropriate shops that can be locked and are not accessible to unauthorised persons or children;
 - Under no circumstances should pesticides be kept in a place where they could be mistaken for food or drink;
 - Keep pesticides dry but out of the sun;
- Do not transport pesticides in a vehicle also used for transporting foodstuffs.

3.5.2.3.3. In terms of cleaning empty pesticide packaging and containers

- Advise against the reuse of empty pesticide containers, as there is a risk of contamination. However, some pesticide containers may be considered too useful to be simply thrown away after use. Can such containers be cleaned and reused? This depends on both the material and the contents.

- In principle, the label should indicate how the containers can be reused and how they can be cleaned;
- Under no circumstances should containers that have contained pesticides classified as very dangerous or extremely dangerous be reused. Under certain conditions, containers of pesticides classified as low hazard or not normally expected to present a hazard in normal use may be reused, provided they are not used to contain food, drink or food ;
- Do not reuse containers made of materials such as polyethylene, which preferentially absorb pesticides, if they have contained pesticides whose active ingredient is classified as moderately, very or extremely hazardous, regardless of formulation;

3.5.2.3.4. In terms of general hygiene

- Do not eat, drink or smoke when handling insecticides;
- Store food in hermetically sealed tins ;
- Measure, dilute and transfer insecticides with the appropriate equipment; Do not shake or take liquids with bare hands;
- Clear the nozzle orifice of the pump clogged with a flexible rod or act on the valve;
- Wash hands and face with soap and water after each filling ;
- Eat and drink only after washing your hands and face;
- Take a shower at the end of the working day.

3.5.2.3.5. At the level of Individual Protection

- It is mandatory to wear the following personal protective equipment during crop treatment operations:
 - Suit covering the whole hand and foot;
 - Dust, vapour or breathing masks depending on the type of treatment and product used;
 - Gloves ;
 - Glasses ;
 - Bonnets (face shield).
- Wear coveralls or a long-sleeved shirt over trousers, a wide-brimmed hat, turban or other type of headgear, and boots or heavy shoes.
- Avoid wearing sandals ;
- Protect your mouth and nose with a simple means such as a disposable paper mask. The masks must comply with the European Union's EN 140 protection standards, i.e. a class 2 gas/vapour filter corresponding to a pollutant concentration of < 0.5% or 5,000 ppm ;
- Change the mask as soon as it is wet;
- Ensure that protective masks are worn;
- Wear cotton clothes for easy washing and drying. These clothes should cover the body and not have any openings.

3.5.2.3.6. In the preparation of suspensions

Those responsible for bagging the insecticides and preparing the suspensions must take special precautions, namely:

- Wear gloves, an apron and eye protection, for example a face shield (face shields protect the entire face and keep cooler) or goggles, in addition to the protective clothing mentioned above ;
- Cover your mouth and nose as indicated for indoor treatments;
- In addition, be careful not to touch any part of your body with the gloves while handling

pesticides.

3.5.2.3.7. In terms of clothing care

- Always keep protective clothing in perfect condition;
- Carry out periodic checks to ensure that there are no tears or wear and tear in the fabric that could lead to contamination of the epidermis.
- Wash protective clothing and equipment daily with soap and water, separately from other clothing;
- Replace gloves as soon as they are torn or show signs of wear. Gloves require special care;
- Rinse gloves with plenty of water after use before removing them;
- Wash gloves outside and inside at the end of each working day.

3.5.2.3.8. In terms of knowledge and mastery of input use methods and protection measures

- Train and raise awareness of all users of hazardous agricultural inputs, including farmers, by an environmental toxicology expert or agronomist.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.6. PROPOSAL OF RISK MANAGEMENT MEASURES AT THE END OF THE PROJECT PHASE

3.6.1. RISK PREVENTION MEASURES AT THE END OF THE PROJECT PHASE

3.6.1.1. Scenario 1: disposal case

3.6.1.1.1. In terms of biophysical aspects

A) Risk of soil pollution by hazardous solid waste

- Raising farmers' awareness of the harmful effects of empty insecticide containers
- Collecting empty containers and managing them in an environmentally friendly way through decontamination.
- To train the population in the ecological management and reuse of decontaminated containers.
- Burn previously cleaned cardboard, paper or plastic packaging or containers at a safe

distance from homes and drinking water sources.

- Bury all containers, cans, bottles etc. that have contained pesticides;
- Fill the hole as quickly as possible.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

B) Risk of soil pollution from hazardous liquid discharges

- Do not pour the rest of the insecticide suspension directly onto the ground.
- Safely dispose of the insecticide suspension by pouring it into a specially dug hole or pit latrine after the operations;
- Pour all water used for hand washing after treatment into a dugout at least 100 metres from any watercourse, well or dwelling;

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

C) Risk of surface water pollution

- Do not dispose of a pesticide by throwing it in a place where it may contaminate water used for drinking or washing or reach a watercourse. Some insecticides, such as pyrethroids, are highly toxic to fish ;
- Monitoring soil salinity and alkalinity as part of the research and development support programme;
- To set up an awareness and technical support programme to develop appropriate water and crop management practices that promote the drainage of plots after rice cultivation;
- Periodically wash the land with abundant irrigation, followed by systematic drainage to dilute the salts;
- Periodically analyse the water of the rivers upstream and downstream of the irrigated

perimeters.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

D) Risk of pollution and groundwater contamination

- Periodically analyse the quality of water from boreholes and control wells in the irrigated perimeters.
- Setting up a drinking water supply system in the localities of the irrigated perimeters
- Raise awareness of the need to avoid the frequent use of surface water for drinking.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.6.1.1.2. At the level of the human aspects

A) Risk of damage to the health of the population

- To implement, in general, Information, Education and Communication (IEC) programmes on water and malaria diseases and hygiene measures;
- To draw up and implement a socio-educational and sanitary programme and a Plan for the control and monitoring of pathologies linked to the presence of water on a permanent basis in the project area.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

B) Risk of accidents at work on farmers' farms

- Train and raise awareness among farmers on the risks of accidents in irrigated areas;
- Train and raise awareness among farmers in the use of farming tools, including ploughs and other equipment that can cause accidents on farms;
- Raise awareness among farmers to have a medical kit for minor injuries.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

C) Risk of poisoning for farmers and the population

C1) On the level of packaging labelling

- Packaging and labelling of pesticides in accordance with WHO standards. The label must be written in French, with pictograms; it must indicate the contents, the safety instructions (warning) and any measures to be taken in case of accidental ingestion or contamination;
- Always leave the product in its original container.

C2) In terms of storage and transport

- Keep pesticides in appropriate shops that can be locked and are not accessible to unauthorised persons or children;
- Under no circumstances should pesticides be kept in a place where they could be

mistaken for food or drink;

- Keep pesticides dry but out of the sun;
Do not transport pesticides in a vehicle also used for transporting foodstuffs.
- C3) In the cleaning of empty pesticide packaging and containers
- Advise against the reuse of empty pesticide containers, as there is a risk of contamination. However, some pesticide containers may be considered too useful to be simply thrown away after use. Can such containers be cleaned and reused? This depends on both the material and the contents.
 - In principle, the label should indicate how the containers can be reused and how they can be cleaned;
 - Under no circumstances should containers that have contained pesticides classified as very dangerous or extremely dangerous be reused. Under certain conditions, containers of pesticides classified as low hazard or not normally expected to present a hazard in normal use may be reused, provided they are not used to contain food, drink or food ;
 - Do not reuse containers made of materials such as polyethylene, which preferentially absorb pesticides, if they have contained pesticides whose active ingredient is classified as moderately, very or extremely hazardous, regardless of formulation;

C4) In terms of general hygiene

- Do not eat, drink or smoke when handling insecticides;
- Store food in hermetically sealed tins ;
- Measure, dilute and transfer insecticides with the appropriate equipment; Do not shake or take liquids with bare hands;
- Clear the nozzle orifice of the pump clogged with a flexible rod or act on the valve;
- Wash hands and face with soap and water after each filling ;
- Eat and drink only after washing your hands and face;
- Take a shower at the end of the working day.

C5) At the level of individual protection

- It is mandatory to wear the following personal protective equipment during crop treatment operations:
 - Suit covering the whole hand and foot;
 - Dust, vapour or breathing masks depending on the type of treatment and product used;
 - Gloves ;
 - Glasses ;
 - Bonnets (face shield).
- Wear coveralls or a long-sleeved shirt over trousers, a wide-brimmed hat, turban or other type of headgear, and boots or heavy shoes.
- Avoid wearing sandals ;
- Protect your mouth and nose with a simple means such as a disposable paper mask. The masks must comply with the European Union's EN 140 protection standards, i.e. a class 2 gas/vapour filter corresponding to a pollutant concentration of < 0.5% or 5,000 ppm ;
- Change the mask as soon as it is wet;
- Ensure that protective masks are worn;
- Wear cotton clothes for easy washing and drying. These clothes should cover the body and not have any openings.

C6) In the preparation of suspensions

Those responsible for bagging the insecticides and preparing the suspensions must take special

precautions, namely:

- Wear gloves, an apron and eye protection, for example a face shield (face shields protect the entire face and keep cooler) or goggles, in addition to the protective clothing mentioned above ;
- Cover your mouth and nose as indicated for indoor treatments;
- In addition, be careful not to touch any part of your body with the gloves while handling pesticides.

C7) In terms of garment maintenance

- Always keep protective clothing in perfect condition;
- Carry out periodic checks to ensure that there are no tears or wear and tear in the fabric that could lead to contamination of the epidermis.
- Wash protective clothing and equipment daily with soap and water, separately from other clothing;
- Replace gloves as soon as they are torn or show signs of wear. Gloves require special care;
- Rinse gloves with plenty of water after use before removing them;
- Wash gloves outside and inside at the end of each working day.

C8) At the level of knowledge and mastery of input use methods and protection measures

- Train and raise awareness of all users of hazardous agricultural inputs, including farmers, by an environmental toxicology expert or agronomist.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.6.1.2. Scenario 2: dismantling case

3.6.1.2.1. In terms of biophysical aspects

A) Risk of soil pollution

- Comply with WHO guidelines on water discharge
- Avoid contact of hydrocarbons and waste oils with the soil.
- Carry out maintenance of vehicles and machinery on a waterproof platform
- Collect used oil from the base camp in bins and drums and have it processed by the appropriate approved services.
- Do not maintain machines on the building site.

Level of probability of success of preventive measures: Medium

Responsible for implementation: Promoter

Responsible for monitoring: ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

B) Risk of surface water pollution

- Comply with WHO guidelines on water discharge
- Avoid contact of hydrocarbons and waste oils with water.
- Collect used oil from the base camp in bins and drums and have it processed by the appropriate approved services.
- Do not maintain machines on the building site.

Level of probability of success of preventive measures: Medium

Responsible for implementation: Promoter

Responsible for monitoring: ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.6.1.2.2. At the level of the human aspects

A) Risk of traffic accidents

- Take out an insurance policy for the construction site covering staff and workers ;
- Putting up building site and traffic signs (Exit of trucks and machinery) ;
- Raise awareness of road safety among workers and the local population;
- Marking the boundaries of work areas ;
- Regulating traffic (speed limits) at crossings of built-up areas and neighbourhoods ;
- Daily check that the braking system and the reverse warning system of vehicles and

-
- construction machinery are in good working order;
- Hold weekly meetings on site safety ;
 - Insist on the vigilance of machine and truck drivers;
 - Keep as far away as possible any person whose presence on the site is not essential so that they are not the victim of an accident;
 - Train workers and company staff in first aid.

Probability of success of the preventive measure:

Medium **Responsible for implementation:** Promoter

Responsible for monitoring : ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

B) Risk of occupational accidents of the personnel on the building site

- Regularly raise awareness among workers and staff on compliance with occupational health and safety rules;
- Equip workers with suitable personal protective equipment ;
- Require the effective wearing of protective equipment ;
- Apply the rules of hygiene and safety at work ;
- Put up road signs ;
- Provide a first-aid station for first aid.

Likelihood of success of the preventive measure: Medium

Responsible for implementation : Promoter

Responsible for monitoring : ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

C) Risk of travel accidents

- Raising workers' awareness of commuting accidents ;
- Insist on the vigilance of workers as they leave the building sites and on their journey from home to the building sites and vice versa;
- Do not make detours when leaving the house for the construction sites or when returning home at the end of the construction day;
- Notify your supervisor when you have to make unintentional detours.

Likelihood of success of the avoidance measure: Medium

Responsible for implementation : Promoter

Responsible for monitoring and control : ANGE

Costs : Included in the business market

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

D) Risks to the safety of the company's personnel during the works

- Raise workers' awareness about hygiene and health on the construction site ;
- Equipping employees with suitable PPE and ensuring that it is worn;
- To set up a functional care centre ;
- Training staff in first aid;
- Mark danger areas with signs and markers.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs: Included in the contract of the works company

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

E) Risk of damage to the health of the company's personnel working on the works

- Raise workers' awareness about hygiene and health on the construction site ;
- Equipping employees with suitable PPE and ensuring that it is worn;
- To set up a functional care centre ;
- Training staff in first aid;
- Mark danger areas with signs and markers.

Probability of success of the preventive measure: Medium

Responsible for implementation: Promoter **Responsible**

for monitoring and control: ANGE

Costs: Included in the contract for the works company

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

F) Risk of contamination and spread of sexually transmitted infections and coronavirus

- Carry out, through a qualified entity, an STI/HIV/AIDS risk awareness program that will include all necessary measures to reduce the risk of the spread of STI/HIV/AIDS among workers as well as local populations,

Likelihood of success of the preventive measure: Medium

Responsible for implementation : Promoter

Responsible for monitoring : ANGE

Costs : PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.6.1.3. Scenario 3: cases of abandonment

3.6.1.3.1. Risk prevention measures on the biophysical environment

- Continue by implementing the preventive measures applied in the exploitation phase
- Dismantle the works in the irrigated perimeters.
- Study the possibility of rebuilding new irrigated perimeters or rehabilitating old ones according to the needs of the moment.

Responsible for implementation: Promoter

Responsible for monitoring and control:

ANGE **Costs:** PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

3.6.1.3.2. Preventive measures for risks to the human environment

- Continue by implementing the preventive measures applied in the exploitation phase
- Dismantle the works in the irrigated perimeters.
- Study the possibility of rebuilding new irrigated perimeters or rehabilitating old ones according to the needs of the moment.

Responsible for implementation: Promoter

Responsible for monitoring and control:

ANGE **Costs:** PM

Residual risk assessment

Probability (P)						
Frequent	5					
Uncommon	4	14				
Rare	3					
Very rare	2					
Extremely	1					
Gravity (G)		1	2	3	4	5
		Minor	Significant	Review	Internal disaster	External disaster

The probability of residual risk is infrequent and its severity is minor. The PxG indicator of the risk is 14. This risk is therefore acceptable but will need to be closely monitored.

4- ENVIRONMENTAL MONITORING, CONTROL AND FOLLOW-UP PROGRAMME

4.1. GENERAL PRINCIPLES

The Environmental and Social Impact Assessment described a number of impacts and risks on environmental components and phenomena and proposed measures for mitigating negative impacts and preventing risks. For this reason, it is necessary to draw up a programme for monitoring, environmental follow-up and control of the implementation of the various measures throughout the different phases of the project.

4.1.1. ENVIRONMENTAL MONITORING

Environmental monitoring is the systematic and continuous verification in the field of the implementation of the environmental contractual obligations of the project promoter and the construction company. It is the responsibility of the promoter and its purpose is to ensure compliance with the latter:

- the measures proposed in the ESIA's ESMP and RMP, including mitigation and prevention measures;
- decrees and orders relating to ESIA's, and texts relating to the preservation of natural resources and the environment in Togo;
- the commitments of the Togolese State vis-à-vis the international community with regard to the various conventions on environmental protection ratified and signed;
- the promoter's commitments with regard to laws and regulations on safety, hygiene and public health, management of the population's living environment, protection of the environment and natural resources.

4.1.2. ENVIRONMENTAL MONITORING AND CONTROL

Environmental monitoring allows us to check not only the implementation of the ESMP but also the evolution of environmental parameters during the implementation of a project and during its operation. It is a prerogative of the project manager or promoter and the Environmental Administration represented by the National Environmental Management Agency (ANGE).

The promoter, through its environmental unit, ensures internal monitoring of the implementation of environmental measures throughout all phases of the project. ANGE, on the other hand, ensures external monitoring of compliance with regulations, in particular the decree issuing the environmental compliance certificate.

The environmental monitoring will make it possible to verify, in the field, the regularity of the assessment of certain impacts and the effectiveness of certain mitigation measures provided for in the ESIA.

In addition, monitoring will concern the analysis of the evolution of certain impact receptors (natural and human environment) affected by the project during the exploitation phase.

4.2. MODALITY AND FREQUENCY

4.2.1. ENVIRONMENTAL MONITORING

Monitoring is systematic and continuous in the field from the preparatory phase until the end of the construction phase. It is carried out by an environmentalist or environmental consultancy firm recruited by the developer as a consultant. The promoter, through the consultant, will be required to submit a report every month, during the preparatory and construction phases, on the environmental management of the project, including the implementation of the Environmental and Social Management Plan and the Risk Management Plan. This environmental management report shall include the following elements:

- The impact-causing activities foreseen in the ESMP ;
- Activities carried out during the month
- The impacts and risks identified in the ESMP
- Impacts and risks observed during the month
- The implementation of the environmental and security measures provided for in the ESMP;
- The discrepancies between the activities planned in the ESMP and those actually carried out during the month
- The discrepancies between the impacts predicted in the ESMP and those actually observed during the month
- Non-conformities in the implementation of the ESMP during the month
- Accidents and incidents observed during work during the month
- Recommendations for a good implementation of environmental measures

4.2.2. MONITORING AND CONTROL OF THE IMPLEMENTATION OF THE RECOMMENDED MEASURES

Environmental monitoring will be carried out on a regular but not necessarily systematic basis during all phases of the project (from the preparatory phase to the end of the project through the construction and operation phases) and will consist of :

- Verify the implementation of environmental measures both qualitatively and quantitatively;
- Recording incidents and regularising them ;
- Assess the adequacy of the means implemented in relation to the problem of the identified environmental and social impacts and risks;
- Ensure that the PGES, the PGR and possibly the RAP are respected.
- Verify and analyse the evolution of certain environmental parameters of the components of the environment during the project's exploitation phase and the end of project phase.

The promoter will have to communicate to ANGE, the final programme of environmental monitoring and follow-up before the start of the various project activities. A monitoring and follow-up report will be sent to ANGE during the various phases of the project.

ANGE monitors and controls the implementation of the Environmental and Social Management Plan and compliance with the specifications contained in the ministerial order issuing the environmental compliance certificate. It ensures that the promoter complies with the commitments made in the ESMP and proposes sanctions against the promoter in the event of failure to meet its commitments and obligations.

Following the monthly monitoring and environmental follow-up reports of the works presented by the Promoter on the environmental management of the project, a monitoring and control commission will have to be set up by ANGE in order to carry out the field verification. However, ANGE may also undertake unannounced visits to the worksites. In the event of an unforeseen serious environmental problem, an extraordinary visit to the worksites would be indispensable.

In accordance with article 55 of Decree No. 2017-040/PR of 23 March 2017 establishing the procedure for environmental and social impact studies, "A monitoring agreement for the ESMP must be signed between the promoter and ANGE".

4.3. **ELEMENTS SUBJECT TO SURVEILLANCE, MONITORING AND CONTROL**

The monitoring and follow-up of the implementation of the ESMP will have to comply with the principle of proportionality. Their content will therefore depend on the environmental and social issues specific to the sites and will have to include the effectiveness of the implementation of the mitigation measures selected in the ESIA Environmental and Social Management Plan (Figure 2).

Figure 2: Example of an environmental monitoring and follow-up programme

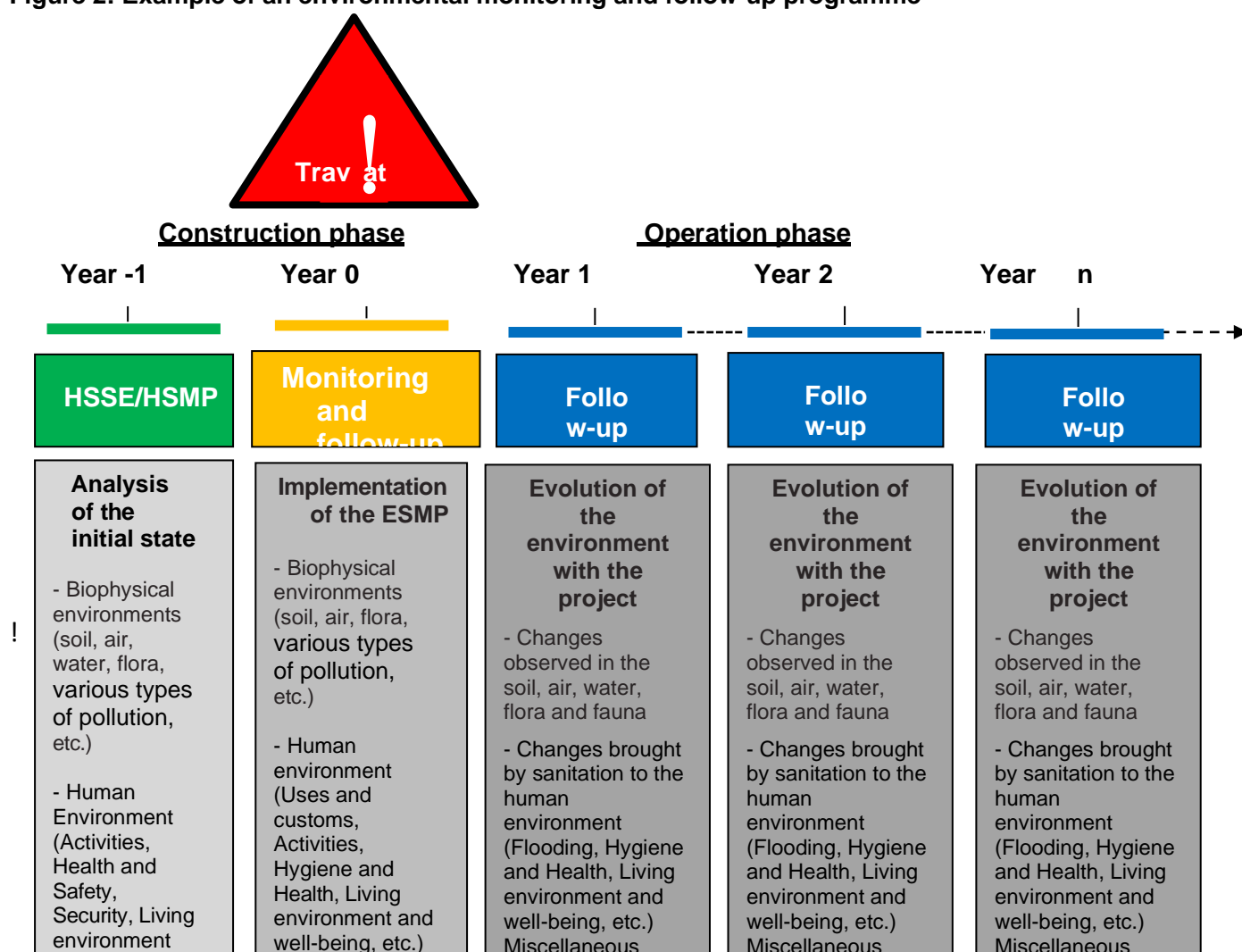


Table 15 presents the elements that will need to be monitored and followed up and a framework for the implementation of the environmental monitoring plan, and Table 16 presents the parameters to be observed and/or measured during environmental monitoring and follow-up activities. Monitoring, follow-up and control should include the effectiveness of the implementation of the mitigation measures identified in the Environmental and Social Management Plan (Table 17) and the preventive measures of the Risk Management Plan (Table 18).

Table 15: Outline of the environmental monitoring, follow-up and control programme

Elements of surveillance, monitoring and control	Tasks of supervision, monitoring and control	Structures			
		Supervision (Preparatory and monitoring phase) construction)		Monitoring and control (Preparatory, construction and monitoring phase) of operation)	
		Internal	External	Internal	External
Waters	<ul style="list-style-type: none"> - Surveillance and monitoring of water resource use activities - Surveillance and monitoring of water quality. 	Work company	Office study and monitoring	Promoter	ANGE
Floors	<ul style="list-style-type: none"> - Surveillance and monitoring of soil destruction ; - Surveillance and monitoring of nuisances, pollution and various types of soil contamination; - Soil reclamation monitoring and follow-up 	Work company	Design and monitoring office	Promoter	ANGE
Ecosystem / Flora / Fauna / Biodiversity	<ul style="list-style-type: none"> - Surveillance and monitoring of the degradation and recovery of vegetation ; - Surveillance and monitoring of reforestation measures, plantations and replenishment of vegetation cover ; - Assessment of the degradation or modification of the ecosystem and of plant and animal biodiversity 	Work company	Design and monitoring office	Promoter	ANGE
Pollution and noise pollution	<ul style="list-style-type: none"> - Supervision and monitoring of the collection of solid and liquid waste from the construction site and the company's life base ; - Surveillance and monitoring of places where waste water or other effluent is discharged; - Monitoring and follow-up of noise emission thresholds ; - Monitoring and follow-up of the emission level of fumes, gases and dusts 	Work company	Design and monitoring office	Promoter	ANGE

Populations and farmers	<ul style="list-style-type: none"> - Surveillance and monitoring of the level of awareness of the population and workers on STIs - HIV/AIDS ; - Monitoring and follow-up of the level of awareness of workers - Monitoring the effectiveness and efficiency of awareness-raising measures; - Monitoring of the hiring and recruitment programme for the local workforce ; - Monitoring of the number of both native and non-native farmers in the irrigated perimeter 	Work company	Design and monitoring office	Promoter	ANGE
Measures health and safety hygiene	<ul style="list-style-type: none"> - Monitoring and following up on the existence of appropriate signs in the right places; - Monitoring and follow-up of the compliance of transport vehicles with the regulations in force; - Supervision and monitoring of compliance with labour legislation: provision and wearing of adequate protective equipment for staff and workers. - Monitoring and follow-up of the existence of safety instructions in the event of accidents; - Monitoring and follow-up of the respect of hygiene measures on the building site; - Monitoring and follow-up of the level of safety awareness of the company's staff and the local population. - Monitoring farmers' use of agricultural inputs - Follow-up of the management of empty input containers ; 	Work company	Design and monitoring office	Promoter	ANGE
Integration of the project into its landscape	<ul style="list-style-type: none"> - Assessment of the forecasts: were the forecasts well made? Does the project resemble what was announced in the impact study? - Assessment of the real evolution of the site: Have the environmental prescriptions been followed up? Have they achieved their objective? - Assessment of other developments. What unforeseen developments have occurred? - Appreciation of the appropriation of the project by the populations. 	-	-	Promoter	ANGE

Table 16: Parameters to be observed and/or measured

Impacts	Parameters to be observed or measured	Place of observation or measurement	Methods and equipment required	Frequency of observation or measurement	Objectives of observation or measurement
Destruction of vegetation cover and wildlife habitats	<ul style="list-style-type: none"> - Area cleaned compared to the area required - State of the vegetation - Reforested area - Number of plants planted 	<ul style="list-style-type: none"> - Work sites - Surrounding vegetation 	<ul style="list-style-type: none"> - Visual observation - Measurements <i>in situ</i> - Photographic camera - Interviews 	<ul style="list-style-type: none"> - Daily supervision during the course work and on complaints - Monitoring and control once every three months at the time of works and once every six months and on complaints during the operation phase. 	<ul style="list-style-type: none"> - Ensure that the company does not clean up the site more than necessary - Make sure that the trees have actually been planted and maintained (Compensatory Reforestation)
Air pollution and odour nuisance	<ul style="list-style-type: none"> - Air quality : - Dust level - Smoke level - Suspended particles, MP10, MP2.5 - Volatile Organic Compounds (VOCs) - Odours and odour nuisance 	<ul style="list-style-type: none"> - Work sites - Vegetation and surrounding dwellings 	<ul style="list-style-type: none"> - Visual and sensory observation - Measurements <i>in situ</i> - Photographic camera - Interviews 	<ul style="list-style-type: none"> - Daily supervision during the course work and on complaints - Monitoring and control once every three months at the time of works and once every six months and on complaints during the operation phase. 	<ul style="list-style-type: none"> - Ensuring compliance with regulations and standard values in Health, Safety and the Environment - Ensure compliance with air quality standards
Water pollution	<ul style="list-style-type: none"> - Water quality - Materials in suspension, - Hydrocarbons, oils and fats, - Heavy metals, - pH, - Water conductivity, - Chemical Oxygen Demand - Biochemical Oxygen Demand, - Total coliform, - Total nitrogen - Total Phosphorus 	<ul style="list-style-type: none"> - Watercourses - Points sampled upstream and downstream of the perimeter 	<ul style="list-style-type: none"> - Visual observation - <i>In situ</i> measurement - Sample taking and laboratory analysis (laboratory equipment) - Photographic camera - Interviews 	<ul style="list-style-type: none"> - Daily supervision during the course of work and on complaints - Monitoring and control once every three months at the time of works and once every six months and on complaints during the operation phase. 	<ul style="list-style-type: none"> - Checking the quality of water discharged into nature - Ensure compliance with regulations and standard values in Health, Safety and Environment (WHO guidelines and standards). - Ensure compliance with surface water quality standards

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Soil pollution	<ul style="list-style-type: none"> - Soil quality - Solid waste (household waste, Defecation in nature - Etc. 	<ul style="list-style-type: none"> - Sites of the works, - Material storage areas - Washing areas for construction machinery and vehicles, maintenance facilities for construction machinery and vehicles - Company life bases - Neighbourhoods and dwellings close to irrigated areas 	<ul style="list-style-type: none"> - Visual observation - <i>In situ</i> measurement - Sample taking and laboratory analysis (laboratory equipment) - Photographic camera - Interviews 	<ul style="list-style-type: none"> - Daily supervision during the course work and on complaints - Monitoring and control once every three months at the time of works and once every six months and on complaints during the operation phase. 	<ul style="list-style-type: none"> - Checking the quality of water discharged into nature - Ensuring compliance with regulations and standard values in Health, Safety and the Environment - Ensuring compliance with soil quality standards
Impacts	Parameters to be observed or to measure	Place of observation or measuring	Methods and equipment necessary	Frequency of observation or measurement	Objectives of the observation or measurement
Noise pollution	<ul style="list-style-type: none"> - Noise level - Duration and hours of work - Exposure time of workers in companies 	<ul style="list-style-type: none"> - Sites of the works, - Company life bases - Dwellings near irrigated perimeters 	<ul style="list-style-type: none"> - Direct observation - Sound level meter measurement - Interviews 	<ul style="list-style-type: none"> - Daily supervision during the course work and on complaints - Monitoring and control once a month 	<ul style="list-style-type: none"> - Check for noise and vibration nuisance caused by construction work - Ensuring compliance with regulations and standard values in Health, Safety and the Environment - Ensuring compliance with noise and nuisance standards
Security	<ul style="list-style-type: none"> - Wearing Personal Protective Equipment (PPE), - Traffic organisation - Layout of temporary traffic and safety signs - Sanitary devices on building sites - Raising awareness of the risks of accidents at work, on the way to work and in traffic - Population behaviour 	<ul style="list-style-type: none"> - Site of the works, - Company life bases - Route taken by trucks and construction machinery - Site of the irrigated perimeters at the exploitation phase 	<ul style="list-style-type: none"> - Direct observation - Photographic camera - Interviews and awareness-raising 	<ul style="list-style-type: none"> - Daily supervision during the work and on complaints - Monitoring and control once a month 	<ul style="list-style-type: none"> - Ensuring compliance with regulations and standard values in Health, Safety and the Environment - Ensuring that awareness raising is effective - Assessing the level of social harmony between the population and the works

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Hygiene and health	<ul style="list-style-type: none"> - Hygiene in base life - Sanitary devices on building sites - Raising awareness of the risks of STIs-HIV/AIDS - Raising awareness on waterborne diseases 	<ul style="list-style-type: none"> - Site of the works, - Company life bases - Populations in the project area - Site of the irrigated perimeters at the exploitation phase 	<ul style="list-style-type: none"> - Direct observation - Photographic camera - Interviews - OHIV/AIDS testing - Meetings - Pictograms 	<ul style="list-style-type: none"> - Daily supervision during the work and on complaints - Monitoring and control once every six months and on complaints at the operation phase 	<ul style="list-style-type: none"> - Ensuring compliance with regulations and standard values in Health, Safety and the Environment - Ensuring that awareness raising is effective
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Table 17: Summary of the Environmental and Social Management Plan (ESMP)

Project phases	Activities	Negative impacts	Mitigation and compensation measures	Period of implementation work	Person in charge of implementation work	Head of supervision and follow-up	Monitoring indicators	Means of verification	Cost (F CFA)
Preparatory phase	<ul style="list-style-type: none"> - Installation of the building site - Layout and staking - Clearing (brush clearing) and subsoiling 	Loss of vegetation	<ul style="list-style-type: none"> - Clearly define clean-up areas to restrict deforestation. - Limit yourself to using only the surface areas strictly necessary for the work. - Ensure the protection of trees and plants on the construction site and adjacent properties in the irrigated perimeters. - Saving trees in gallery forests - Save in the perimeter area anthropogenic trees of economic value (shea, shea, oil palm, mango and kapok trees) and any vegetation of any tree over 6 metres high that does not interfere with the work or crops. - Prohibit the installation of construction site life bases on wooded sites 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Boundary of brush clearing areas - Area cleaned compared to the area required - Number of trees saved and protected - Spared tree species - Height of trees saved 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Site photos - Site visit - Site visit report 	Included in the contract of the works company
			<ul style="list-style-type: none"> - Carry out compensatory reforestation around the reservoirs and along the rivers downstream of the reservoirs with local natural species. - Favouring endangered or IUCN Red List species - Subcontract the reforestation to a specialised structure (preferably an NGO). - Reforestation with the participation of the local population 	After the works	Promoter	ANGE	<ul style="list-style-type: none"> - Number of trees planted and maintained - Reforested area - Tree species planted - Structure having carried out the reforestation 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Subcontracting contract - Site photos - Site visit - Site visit report 	21 470 000

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		Reduction of medicinal plants	<ul style="list-style-type: none"> - Spare medicinal plants as much as possible when cleaning up the sites. - If possible, transpose medicinal plants that are not hydromorphic to land-based sites. 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Number of plants saved - Number of plants transplanted - Number of complaints handled 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project -- Site photos - Site visit - Site visit report 	Included in the contract of the works company
Project phases	Activities	Negative impacts	Mitigation and compensation measures	Implementation period	Responsible for implementation	Head of surveillance and monitoring	Monitoring indicators	Means of verification	Cost (FCFA)
Preparatory phase	<ul style="list-style-type: none"> - Installation of the building site - Layout and staking - Clearing (brush clearing) and subsoiling 	Loss of wildlife	<ul style="list-style-type: none"> - Limit yourself to using only the surface areas strictly necessary for the work. - Raise awareness of the company's work on wildlife protection among workers - Do not poach. - Do not slaughter and/or capture a wild animal on the site - Do not transport wild meat in construction site trucks by construction site personnel. - Immediately report any incidental capture or killing of wild animals 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Area cleaned compared to the area required - Number of awareness-raising sessions - Number of poaching cases - number of animals slaughtered or captured and reported 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project -- Site photos - Site visit - Site visit report 	Included in the contract of the works company
		Green solid waste on the ground	<ul style="list-style-type: none"> - Clearly define cutting areas to restrict deforestation. - Limit yourself to using only the surface areas strictly necessary for the work. - Collect and make available to local communities for appropriate use tree sections, tree stumps and branches from felled trees. - Storing site cleaning products and reusing them later as a household waste cover - Do not dump excavated material beyond the site perimeter on private land. 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Area cleaned compared to the area required - Volume of wood handed over to the communities - Volume of products stored - Volume of products reused - Dumping limit for excavated material. 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project -- Site photos - Site visit - Site visit report 	Included in the contract of the works company

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		Degradation of the soil structure	<ul style="list-style-type: none"> - Limit the use of only the areas strictly necessary for the perimeters to be irrigated. - Limiting land wastage through uncontrolled subsoiling 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Area cleaned compared to the area required - subsoiling method 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project -- Site photos - Site visit - Site visit report 	Included in the contract of the works company
Project phases	Activities	Negative impacts	Mitigation and compensation measures	Implementation period	Responsible for implementation	Head of surveillance and monitoring	Monitoring indicators	Means of verification	Cost (FCFA)
Preparatory phase	<ul style="list-style-type: none"> - Installation of the building site - Layout and staking - Clearing (brush clearing) and subsoiling 	Air pollution	<ul style="list-style-type: none"> - Comply with WHO air quality guidelines - Watering areas where dust emission is high - Use new or good condition machinery and vehicles - Request the services of equipment and trucks with up-to-date technical inspections or equipment in good condition. - Control the quality of the engines of the machines by regular maintenance. - Prohibit the use of adulterated fuel and oils by machinery/vehicles. - Prohibit the burning of waste on the building site - Prohibit drivers of vehicles and construction equipment from leaving the engine running while the vehicle or equipment is not in use. 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Dust and smoke levels - Watering frequency - Condition of the vehicles - Type of fuel used - Number of vehicles whose technical visits are up to date - Quantity of waste burnt on the site - Condition of vehicles at work stoppage 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site photos - Site visit - Site visit report 	Included in the contract of the works company
		Surface water pollution	<ul style="list-style-type: none"> - Do not place debris on non-stripped and vegetated areas near watercourses. - Do not clear land with machinery on the banks of watercourses. - Do not bring cleaning products into contact with surface water. 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Amount of debris at the edges of watercourses - Means of clearing at the level of river banks - Quantity of cleaning products in surface water 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site visit - Site visit report 	Included in the contract of the works company

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		<p>Aumentation of the noise level in the sound environment of the sites</p>	<ul style="list-style-type: none"> - Use new or good condition machinery and vehicles - Prohibit drivers of vehicles and construction equipment from leaving engines running unnecessarily - Regulating vehicle traffic - Do not honk your horn inopportunely. - Carry out work during regular business hours authorized by regulations 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Condition of machinery and vehicles - Condition of machinery in cessation of work - Noise level - Hours of work 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site photos - Site visit - Site visit report 	Included in the contract of the works company
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Project phases	Activities	Negative impacts	Mitigation and compensation measures	Implementation period	Responsible for implementation	Head of surveillance and monitoring	Monitoring indicators	Means of verification	Cost (FCFA)
Preparatory phase	<ul style="list-style-type: none"> - Installation of the building site - Layout and staking - Clearing (brush clearing) and subsoiling 	Damage to cultural and religious property	- Carry out the exact delimitation of sacred forests in collaboration with the populations.	Before starting work	Promoter	ANGE	- Boundary of sacred forests in relation to irrigated perimeters	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Minutes of negotiation and compensation - Site visit - Site visit report 	Included in the contract of the works company
			- Preserve sacred forests by limiting land clearing to the edge of these forests.	At the time of the work			<ul style="list-style-type: none"> - Limit of land clearing - Number of complaints handled 		
		Temporary loss of crops and crop year	<ul style="list-style-type: none"> - Warn farmers on the perimeters to be irrigated of the imminence of the works. - Compensate for crop losses for one crop year for all farmers identified on the sites of the perimeters to be irrigated. 	Before starting work	Promoter	ANGE	<ul style="list-style-type: none"> - Number of operators notified - Number of operators compensated - Number of complaints handled 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Interview - Minutes of negotiation and compensation - Site visit - Site visit report 	See RAP cost
		Respiratory nuisance at the level of the employees of the construction company	<ul style="list-style-type: none"> - Comply with WHO air quality guidelines - Watering areas likely to cause dust emissions - Distribute appropriate personal protective equipment (PPE) to workers on construction sites. - Ensure that PPE is actually worn by workers and, if necessary, punish recalcitrant workers. 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Air quality - Watering frequency - Dust level - Number and type of PPE distributed - Number of people wearing PPE 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site photos - Site visit - Site visit report 	Included in the contract of the works company

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Project phases	Activities	Negative impacts	Mitigation and compensation measures	Period from implementation	Responsible of implementation	Responsible for monitoring and follow-up	Monitoring indicators	Means of verification	Cost (F CFA)
Preparatory phase	<ul style="list-style-type: none"> - Installation of the building site - Bringing in construction equipment - Clearing (brush clearing) and subsoiling 	Noise pollution at the level of the employees of the works company	<ul style="list-style-type: none"> - Use new or good condition machinery and vehicles - Request the services of equipment and trucks with up-to-date technical inspections or equipment in good condition. - Monitor noise levels of heavy machinery and tools - Carry out work only during regular business hours authorized by regulations - Prohibit drivers of vehicles and construction equipment from leaving engines running unnecessarily - Do not honk the horn on the building site. - Provide employees with suitable PPE and ensure that they are worn properly. - Do not expose any employee to a noise level higher than 85 dB(A) for a period of more than 8 hours a day without wearing appropriate PPE. 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Condition of the equipment - Number of vehicles with updated technical visit - Noise level - Hours of work - Condition of vehicles at work stoppage - Number and type of PPE - Percentage of workers wearing PPE - Workers' exposure time to noise sources - Number of onlookers on the building site 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site photos - Site visit - Site visit report 	Included in the contract of the works company

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Project phases	Activities	Negative impacts	Mitigation and compensation measures	Period from implementation	Responsible of implementation	Responsible for monitoring and follow-up	Monitoring indicators	Means of verification	Cost (F CFA)
Construction phase	<ul style="list-style-type: none"> - Construction of water supply canals in the perimeters to be irrigated and in the lowlands - Construction of the irrigation system consisting of primary, secondary and tertiary canals - Construction of the drainage system consisting of rainwater drainage channels as well as the emptying of the plots - Construction of a network of access tracks, services and facilities operation 	Degradation of the soil structure	<ul style="list-style-type: none"> - Limit yourself to using only the surface areas strictly necessary for the work. - Properly compact the soil during backfilling in the excavated areas to ensure better stability. - During the work, the excavation depths and excavations determined by the plans must be respected. - Protect areas prone to erosion by grassing or rockfill. 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Area of land used in relation to the area available - Compaction level - Depth of excavations and pits - Number of protected areas - Type of protection 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site visit - Site visit report 	Included in the contract of the works company
		Soil pollution by solid waste	<ul style="list-style-type: none"> - To have daily solid waste collection bins at all levels of the construction site - Empty all waste bins regularly and in any case before overflowing into the bins or into a skip. - Regularly transfer the waste from the bins or skip before overflowing to a landfill approved by the project owner (Promoter) or the project manager on the building site; - Removing inert waste from sites or reusing other inert waste such as sand and gravel for other purposes. - Collect and make available to local communities the tree sections, tree stumps and branches of felled trees 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Number of bins used on the building site - Number of skips - Frequency of solid waste transfer - amount of solid waste transferred - Quantity of inert waste evacuated - Quantity of plant debris given to the population 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site visit - Site visit report 	1 500 000

Project phases	Activities	Negative impacts	Mitigation and compensation measures	Period from implementation	Responsible of implementation	Responsible surveillance and monitoring	Monitoring indicators	Means of verification	Cost (F CFA)
Construction phase	<ul style="list-style-type: none"> - Construction of water supply canals in the perimeters to be irrigated and in the lowlands - Construction of the irrigation system consisting of primary, secondary and tertiary canals - Construction of the drainage system consisting of rainwater drainage channels as well as the emptying of the plots - Construction of a network of access tracks, 	Increase in air pollution	<ul style="list-style-type: none"> - Comply with WHO air quality guidelines - Watering areas where dust emission is high - Use new or good condition machinery and vehicles - Request the services of equipment and trucks with up-to-date technical inspections or equipment in good condition. - Control the quality of the engines of the machines by regular maintenance. - Prohibit the use of adulterated fuel and oils by machinery/vehicles. - Prohibit the burning of waste on the building site - Prohibit drivers of vehicles and construction equipment from leaving the engine running while the vehicle or equipment is not in use. 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Dust and smoke levels - Watering frequency - Condition of the vehicles - Type of fuel used - Number of vehicles whose technical visits are up to date - Quantity of waste burnt on the site - Condition of vehicles at work stoppage 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site photos - Site visit - Site visit report 	Included in the contract of the works company
		Surface water pollution	<ul style="list-style-type: none"> - Do not place debris on non-stripped and vegetated areas near watercourses. - Do not clear land with machinery on the banks of watercourses. - Do not bring cleaning products into contact with surface water. 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Amount of debris at the edges of watercourses - Means of clearing at the level of river banks - Quantity of cleaning products in surface water 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site visit - Site visit report 	Included in the contract of the works company

	services and facilities operation	Surface water depletion	<ul style="list-style-type: none"> - Define the water allocation on the construction site - Implementing and organising the monitoring of water consumption - Rational use of water resources - Train and sensitise workers to good water management on the site 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Defined quantity of water for the construction site - Existence of a water consumption monitoring system - Amount of water unnecessarily discharged on the job site - Number of awareness sessions -Percentage of people reached 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site visit - Site visit report 	Included in the contract of the works company
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Project phases	Activities	Negative impacts	Mitigation and compensation measures	Implementation period	Responsible for implementation	Head of surveillance and monitoring	Monitoring indicators	Means of verification	Cost (FCFA)
Construction phase	<ul style="list-style-type: none"> - Construction of water supply canals in the perimeters to be irrigated and in the shallows - Construction of the irrigation system consisting of primary, secondary and tertiary canals - Construction of the drainage system consisting of rainwater drainage channels as well as the emptying of the plots - Construction of a network of access tracks, services and facilities operation 	Increase in the noise level in the noise environment of the sites	<ul style="list-style-type: none"> - Use new or good condition machinery and vehicles - Prohibit drivers of vehicles and construction equipment from leaving engines running unnecessarily - Regulating vehicle traffic - Do not honk your horn inopportunely. - Carry out work during regular business hours authorized by regulations 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Condition of machinery and vehicles - Condition of machinery in cessation of work - Noise level - Hours of work 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site photos - Site visit - Site visit report 	Included in the contract of the works company
		Respiratory nuisance for employees of the company working on air pollution-related jobs	<ul style="list-style-type: none"> - Comply with WHO air quality guidelines - Watering areas likely to cause dust emissions - Distribute appropriate personal protective equipment (PPE) to workers on construction sites. - Ensure that PPE is actually worn by workers and, if necessary, punish recalcitrant workers. 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Air quality - Watering frequency - Dust level - Number and type of PPE distributed - Number of people wearing PPE 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site photos - Site visit - Site visit report 	See Costs of measures against the risks of accidents at work and damage to workers' health.
		Respiratory nuisances at the population level related to air pollution	Frequent watering of the tracks used by vehicles transporting building materials across built-up areas.	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Air quality - Watering frequency - Dust level - Number of complaints handled 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site photos - Site visit - Site visit report 	Included in the contract of the works company

Project phases	Activities	Negative impacts	Mitigation and compensation measures	Implementation period	Responsible for implementation	Head of surveillance and monitoring	Monitoring indicators	Means of verification	Cost (FCFA)
Construction phase	<ul style="list-style-type: none"> - Construction of water supply canals in the perimeters to be irrigated and in the shallows - Construction of the irrigation system consisting of primary, secondary and tertiary canals - Construction of the drainage system consisting of rainwater drainage channels as well as the emptying of the plots - Construction of a network of access tracks, services and facilities operation 	Noise pollution at the level of the employees of the works company	<ul style="list-style-type: none"> - Use new or good condition machinery and vehicles - Request the services of equipment and trucks with up-to-date technical inspections or equipment in good condition. - Monitor noise levels of heavy machinery and tools - Carry out work only during regular business hours authorized by regulations - Prohibit drivers of vehicles and construction equipment from leaving engines running unnecessarily - Do not honk the horn on the building site. - Provide employees with suitable PPE and ensure that they are worn properly. - Do not expose any employee to a noise level higher than 85 dB(A) for a period of more than 8 hours a day without wearing appropriate PPE. 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Condition of the equipment - Number of vehicles with updated technical visit - Noise level - Hours of work - Condition of vehicles at work stoppage - Number and type of PPE - Percentage of workers wearing PPE - Workers' exposure time to noise sources - Number of onlookers on the building site 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site photos - Site visit - Site visit report 	Included in the market of the construction company

Project phases	Activities	Negative impacts	Mitigation and compensation measures	Implementation period	Responsible or implementation	Head of surveillance and monitoring	Monitoring indicators	Means of verification	Cost (FCFA)
Operation phase	<ul style="list-style-type: none"> - Irrigation of the plots - Use of inputs - Labour 	Modification of soil structure	<ul style="list-style-type: none"> - Do not overwater to prevent leaching of nutrients from the soil. - Adopt the System of Intensive Rice Growing (SRI), which consumes little water and chemical fertiliser but is highly productive per hectare. - Alternate crops to allow nutrients to replenish themselves. - Incorporating organic manure into soil amendment - Favour biological control for soil maintenance and improvement over chemical control. - Significantly reduce the quantities of inputs typically used - Encouraging the use of registered pesticides for the benefit of all (unregistered) vendors - Involve structures such as ITRA, ICAT and the NGO GRAPHE in the implementation of an awareness and technical support programme for the development of the practice of the Intensive Rice Growing System (IRS) 	At the time of operation of the irrigated perimeters	<ul style="list-style-type: none"> - Promoter - Farmers - Producer groups - CVD/CCD 	ANGE	<ul style="list-style-type: none"> - Watering level - Input dosage level - Type of rice cultivation practised - Amount of organic manure used - Type of pesticides used - Type of maintenance and - Quantity of inputs used - Type of pesticides used - Number of working sessions of the structures - Existence of a programme - Number of awareness-raising and training sessions - Percentage of people trained and sensitised 	<ul style="list-style-type: none"> - Environmental monitoring or audit report of the project - Site visit - Site visit report 	PM

Project phases	Activities	Negative impacts	Mitigation and compensation measures	Implementation period	Responsible for implementation	Head of surveillance and monitoring	Monitoring indicators	Means of verification	Cost (FCFA)
Operation phase	<ul style="list-style-type: none"> - Irrigation of the plots - Use of inputs - Labour 	Salinisation, alkalisation and alkalisation of soils	<ul style="list-style-type: none"> - Adjusting the flow of water applied to the land, to avoid over-watering (including a device to cut off the water supply to the irrigation channels) and waterlogging. - Set up and maintain an appropriate perimeter drainage system - To set up an awareness and technical support programme for the development of appropriate water and crop management practices that promote the drainage of plots after rice cultivation. - Raising awareness among farmers and insisting on a considerable reduction in the quantities of inputs usually used - Encouraging the use of registered pesticides for the benefit of all (unregistered) vendors - Favour biological control for soil maintenance and improvement over chemical control. - Adopt the System of Intensive Rice Growing (SRI), which consumes little water and chemical fertiliser but is highly productive per hectare. - Monitor soil salinity and alkalinity as part of the research and development support programme - Associate structures such as 	At the time of operation of the irrigated perimeters	<ul style="list-style-type: none"> - Promoter - Farmers - Producer groups - CVD/CCD 	ANGE	<ul style="list-style-type: none"> - Amount of water applied to the land - Drainage system maintenance frequency - Existence of an awareness-raising programme - Number of awareness-raising sessions - Percentage of people reached - Type of pesticides used - Quantity of inputs used - Type of maintenance fight practised - Type of rice cultivation - Quantity of inputs used - Type of pesticides used - Frequency of soil salinity and alkalinity monitoring - Soil salinity and alkalinity levels - Number of working sessions of the structures - Existence of a programme - Number of awareness-raising and training sessions - Percentage of people trained and sensitised 	<ul style="list-style-type: none"> - Environmental monitoring or audit report of the project - Site visit - Site visit report 	PM

			ITRA, ICAT and the NGO GRAPHE in the implementation of an awareness and technical support programme for the development of the practice of the Intensive Rice Growing System (IRS).						
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Project phases	Activities	Negative impacts	Mitigation and compensation measures	Implementation period	Responsible for implementation	Head of surveillance and monitoring	Monitoring indicators	Means of verification	Cost (FCFA)
Operation phase	- Irrigation of the plots - Use of inputs - Labour	Degradation of soil physico-chemical parameters	- Implement the same measures as those applied to salinisation, alkalisation and alkalisation of soils	At the time of operation of the irrigated perimeters	- Promoter - Farmers - Producer groups - CVD/CCD	ANGE	- Same indicators	- Environmental monitoring or audit report of the project - Site visit - Site visit report	PM
	- Use of inputs - Labour - Harvesting, hulling and storage	Soil pollution by solid plant waste	- Deposit rice crop residues outside the perimeters for livestock farming. - Initiate projects to transform rice residues into cooking charcoal for households and compost for the manufacture of organic fertilizer. - Separate crop residues from input packaging (empty cans and bags, etc.). - Collect all input bags, packaging and cans and see how much of them can be reused. - Carefully destroy all contaminated input bags, packaging and drums.	At the time of operation of the irrigated perimeters	- Promoter - Farmers - Producer groups - CVD/CCD	ANGE	- Location of crop residues - Number of residue processing projects - Existence of separation sorting - Number of bag, packaging and input drums recovered - Number of bag, packaging and input drums destroyed	- Environmental monitoring or audit report of the project - Site visit - Site visit report	PM
	- Irrigation of the plots - Labour	Loss of terrestrial vegetation	- Carry out compensatory reforestation.	In the preparatory and construction phases	Promoter	ANGE	- Number of trees planted and maintained - Reforested area	- Environmental monitoring or audit report of the project - Site visit - Site visit report	PM
			- Maintain the seedlings planted during the project; - Protect gallery forests and plant cover that would not interfere with ploughing.	At the time of operation of the irrigated perimeters	- Promoter - Farmers - Producer groups - CVD/CCD		- Number of trees maintained and matured - State of the forests gallery		

Project phases	Activities	Negative impacts	Mitigation and compensation measures	Implementation period	Responsible for implementation	Responsible for monitoring and follow-up	Monitoring indicators	Means of verification	Cost (FCFA)
Operation phase	- Irrigation of the plots - Labour	Loss of terrestrial wildlife	- Implement the same measures as those applied to the disappearance of ground vegetation	At the time of operation of the irrigated perimeters	- Promoter - Farmers - Producer groups - CVD/CCD	ANGE	- Same indicators	- Environmental monitoring or audit report of the project - Site visit - Site visit report	PM
		Loss of birdlife	- Favour the use of nets, home-made sound equipment, scarecrows and guards to fight grain-eating birds rather than chemicals. - Develop rice varieties that are less attacked by birds. - Report any migratory birds bandaged found dead or injured on site	At the time of operation of the irrigated perimeters	- Promoter - Farmers - Producer groups - CVD/CCD	ANGE	- Type of instrument used to control birds - Type of rice variety grown - Number of ringed migratory birds found	- Environmental monitoring or audit report of the project - Interviews - Site visit - Site visit report	PM
		Mosquito proliferation	- Raise awareness about hygiene and health	At the time of operation of the irrigated perimeters	Promoter	ANGE	- Number of awareness-raising sessions - Percentage of people reached	- Environmental monitoring or audit report of the project - Interviews - Site visit - Site visit report	PM
			- Fight against mosquito habitats in and around houses: boxes, empty jerry cans or any object that can contain water and shelter malaria vectors. - Raise awareness of the population on hygiene and health and the risk of water-borne diseases		- Promoter - Farmers - Producer groups - CVD/CCD		- Quantity and type of objects that can be used as mosquito houses - Number of awareness-raising sessions - Percentage of population aware		

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		Stripping of the landscape	<ul style="list-style-type: none"> - Maintain the trees planted as part of compensatory reforestation around the irrigated perimeters. - Always protect gallery forests and trees that have been spared within the irrigated perimeters. 	At the time of operation of the irrigated perimeters	<ul style="list-style-type: none"> - Promoter - Farmers - Producer groups - CVD/CCD 	ANGE	<ul style="list-style-type: none"> - Number of trees maintained and matured - State of the gallery forests 	<ul style="list-style-type: none"> - Environmental monitoring or audit report of the project - Interviews - Site visit - Site visit report 	PM
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Project phases	Activities	Negative impacts	Mitigation and compensation measures	Implementation period	Responsible for implementation	Responsible for monitoring and follow-up	Monitoring indicators	Means of verification	Cost (FCFA)
Operation phase	<ul style="list-style-type: none"> - Irrigation of the plots - Use of inputs - Labour 	Acceleration of wind speed on the ground	<ul style="list-style-type: none"> - Plant windbreak trees in the direction of the prevailing winds on the landscaped perimeters as part of the project. - Always protect gallery forests and trees that have been spared within the irrigated perimeters. - Maintain the trees planted as part of compensatory reforestation around the irrigated perimeters. 	In the preparatory and construction phases and at the time of operation of the irrigated perimeters	<ul style="list-style-type: none"> - Promoter - Farmers - Producer groups - CVD/CCD 	ANGE	<ul style="list-style-type: none"> - Number of trees maintained and matured - State of the gallery forests 	<ul style="list-style-type: none"> - Environmental monitoring or audit report of the project - Interviews - Site visit - Site visit report 	PM
		Air pollution through methane emissions	<ul style="list-style-type: none"> - Train and sensitize farmers in irrigated perimeters to the Intensive Rice Growing System (IRS). - Involve structures such as ITRA, ICAT, ETD NGOs, and GRAPHE in the setting up of an awareness and technical support programme for development the practice of SRI. 	At the time of operation of the irrigated perimeters	<ul style="list-style-type: none"> - Promoter 	ANGE	<ul style="list-style-type: none"> - Number of working sessions of the structures - Existence of a programme - Number of awareness-raising and training sessions - Percentage of people trained and sensitised 	<ul style="list-style-type: none"> - Environmental monitoring or audit report of the project - Interviews - Site visit - Site visit report 	PM

- Labour - Harvesting , hulling and storage	Damage to the animals by wandering and transhumance in the perimeters	<ul style="list-style-type: none"> - Deposit rice crop residues outside the perimeters. - Set up a Programme for the Integration of Livestock into Agriculture - Promote the use of rice harvest residues for animal husbandry in paddocks. - To set up, in collaboration with the population and the transhumant herdsman, corridors for passage out of the agropole zone. - To make the transhumants scrupulously respect these corridors. - Severely punish the offending herdsmen - Establish conflict resolution between farmers and herders 	At the time of operation of the irrigated perimeters	Promoter	ANGE	<ul style="list-style-type: none"> - Place of deposit of residues - Existence of a programme - Number of farmers trained in pen rearing - Existence of functional passageways outside the agropole - Number of cases of transgressions - Number of sanctioned bouviers containers - Existence of conflict resolution - Number of disputes settled 	<ul style="list-style-type: none"> - Environmental monitoring or audit report of the project - Interviews - Site visit - Site visit report 	PM
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Project phases	Activities	Negative impacts	Mitigation and compensation measures	Implementation period	Responsible for implementation	Responsible for monitoring and follow-up	Monitoring indicators	Means of verification	Cost (FCFA)
Operation phase	- Irrigation of the plots - Use of	Damage to the health of the population	Malaria development - Raise awareness about hygiene and health - Fight against mosquito habitats in and around houses: boxes, empty jerry cans or any object that can contain water and shelter malaria vectors. - Subsidize the purchase of impregnated mosquito nets for the populations in the project area or establish a link with the Ministry of Health to include the project area in the LLIN Programme for the free distribution of mosquito nets. - Assisting the health centres of Broukou and Léon with generic anti-malaria drugs and other measures	At the time of operation of the irrigated perimeters	- Promoter - Farmers - Producer groups - CVD/CCD	ANGE	- Percentage of people reached - State of hygiene and cleanliness around and in the houses - Price of the mosquito net - Number of households using nets - Quantity, types and prices of antimalarial drugs	- Environmental monitoring or audit report of the project - Health centre activity reports - Interviews - Site visit - Site visit report	PM

	inputs - Labour	linked to the development of water-borne diseases	Development of bilharzia - Do not stay in the stagnant water of irrigated areas for long periods of time and too regularly, especially for the following reasons children - To protect water from contamination by human and animal urine and faeces. - Raise awareness among the population (especially children) so that they do not bathe in the stagnant water of the irrigated perimeters. - Do not use pesticides against gastropods because of the enormous toxicity of these inputs. - Providing the health centres of Broukou and Léon with medicines to treat bilharziasis.	At the time of operation of the irrigated perimeters	- Promoter - Farmers - Producer groups - CVD/CCD	ANG E	- Length of stay of the operators in the perimeters - Water quality - Percentage of people reached - Cleanliness around and in the houses - Method for controlling gastropods - Number of households using nets - Quantity, types and prices of antibilharzia drugs	- Environmental monitoring or audit report of the project - Health centre activity reports - Interviews - Site visit - Site visit report	PM
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Project phases	Activities	Negative impacts	Mitigation and/or compensation measures	Implementation period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost (F CFA)
End of project phase	Cases of assignment	Modification of soil structure	Continue by implementing the measures applied in the exploitation phase	To the operation of the scope of consolidation after disposal	Dealer	ANGE	Same indicators as in the operation phase	Same means of verification	PM
		Salinisation, alkalinisation and alkalinisation of soils	Continue by implementing the measures applied in the exploitation phase	To the operation of the scope of consolidation after disposal	Dealer	ANGE	Same indicators as in the operation phase	Same means of verification	
		Degradation of the physico-chemical parameters of the soil	Continue by implementing the measures applied in the exploitation phase	To the operation of the scope of consolidation after disposal	Dealer	ANGE	Same indicators as in the operation phase	Same means of verification	
		Soil pollution by solid plant waste	Continue by implementing the measures applied in the exploitation phase	To the operation of the scope of consolidation after disposal	Dealer	ANGE	Same indicators as in the operation phase	Same means of verification	
		Loss of terrestrial vegetation	Continue by implementing the measures applied in the exploitation phase	To the operation of the scope of consolidation after disposal	Dealer	ANGE	Same indicators as in the operation phase	Same means of verification	
		Loss of terrestrial wildlife	Continue by implementing the measures applied in the exploitation phase	To the operation of the scope of consolidation after disposal	Dealer	ANGE	Same indicators as in the operation phase	Same means of verification	

		Loss of birdlife	Continue by implementing the measures applied in the exploitation phase	To the operation of the scope of consolidation after disposal	Dealer	ANGE	Same indicators as in the operation phase	Same means of verification
		Mosquito proliferation	Continue by implementing the measures applied in the exploitation phase	To the operation of the scope of consolidation after disposal	Dealer	ANGE	Same indicators as in the operation phase	Same means of verification
		Stripping of the landscape	Continue by implementing the measures applied in the exploitation phase	To the operation of the scope of consolidation after disposal	Dealer	ANGE	Same indicators as in the operation phase	Same means of verification

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Project phases	Activities	Negative impacts	Mitigation and/or compensation measures	Implementation period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost (F CFA)
End of project phase	Cases of assignment	Acceleration of wind speed on the ground	Continue by implementing the measures applied in the exploitation phase	To the operation of the scope of consolidation after disposal	Dealer	ANGE	Same indicators as in the operation phase	Same means of verification	PM
		Air pollution through methane emissions	Continue by implementing the measures applied in the exploitation phase	To the operation of the scope of consolidation after disposal	Dealer	ANGE	Same indicators as in the operation phase	Same means of verification	
		Damage to the animals by wandering and transhumance in the perimeters	Continue by implementing the measures applied in the exploitation phase	To the operation of the scope of consolidation after disposal	Dealer	ANGE	Same indicators as in the operation phase	Same means of verification	
		Development of waterborne diseases	Continue by implementing the measures applied in the exploitation phase	To the operation of the scope of consolidation after disposal	Dealer	ANGE	Same indicators as in the operation phase	Same means of verification	
	Cases of dismantling	Soil pollution by solid waste	<ul style="list-style-type: none"> - Install the selective dustbins and systematically put in them all the solid waste of the building site. - Dispose of solid waste at an approved landfill site. - Remove rubble and other debris to the approved landfill site. 	At the time of the dismantling work	Promoter	ANGE	<ul style="list-style-type: none"> - Number of bins - Frequency of waste disposal 	<ul style="list-style-type: none"> - Environmental monitoring report of the project - Photos - Site visit - Site visit report 	
		Air pollution	<ul style="list-style-type: none"> - Comply with WHO air quality guidelines - Regularly maintain vehicles and machinery and check the quality of engines in order to - Prohibit the burning of waste on the construction site 	At the time of the dismantling work	Promoter	ANGE	<ul style="list-style-type: none"> - Air quality standard value - Smoke level - Vehicle condition - No burning 	<ul style="list-style-type: none"> - Environmental monitoring report of the project - Photos - Thumbnails - Site visit - Site visit report 	

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Project phases	Activities	Negative impacts	Mitigation and/or compensation measures	Implementati on period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost (F CFA)
End of project phase	Cases of dismantling	Water pollution	- Comply with WHO guidelines for wastewater discharge - Do not maintain vehicles on site - Do not bring hydrocarbons into contact with water. - Use vehicles in good condition	At the time of the dismantling work	Promoter	ANGE	- Quality of waste water - Number of vehicles entering the site - Absence of hydrocarbons in the water Condition of the vehicles	- Environmental monitoring report of the project - Photos - Thumbnails - Site visit - Site visit report	PM
		Noise emission and nuisance	- Comply with noise emission limits ; - Prohibit drivers of vehicles and construction equipment from leaving engines running unnecessarily; - Checking the noise level of vehicles, machines and construction tools - Carry out the work only during authorised regular business hours.	At the time of the dismantling work	Promoter	ANGE	- Noise level - Condition of vehicles and machinery at a standstill - Hours of work	- Environmental monitoring report of the project - Photos - Site visit - Site visit report	
		Reduction in agricultural production	- To study the possibility of rebuilding new hydro-agricultural facilities. - Undertake the same procedures with regard to the Environmental and Social Impact Assessment.	Before dismantling	Promoter	ANGE	- Design and construction of new mini-dams - Carrying out an ESIA	- Technical files of the new mini-dams - ESIA Report - Environmental compliance certificate	
		Loss of fishing activities							
		Loss of income and impoverishment							

Project phases	Activities	Negative impacts	Mitigation and/or compensation measures	Implementation period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost (F CFA)
End of project phase	Cases of abandonment	Modification of soil structure	- Continue by implementing the measures applied in the exploitation phase	Abandoned	Promoter	ANGE	Same indicators as in the operation phase	Same means of verification	PM
		Salinisation, alkalinisation and alkalisation of soils							
		Degradation of soil physico-chemical parameters							
		Soil pollution by solid plant waste							
		Loss of terrestrial vegetation							
		Loss of terrestrial wildlife	- Study the possibility of a rapid reconstruction of the residence in relation to the needs of the moment. - Undertake the same administrative procedures with regard to the Environmental and Social Impact Assessment.	Before abandonment			- Design and development of new irrigated perimeters - Carrying out an ESIA	- Technical files of irrigated perimeters - ESIA Report - Environmental compliance certificate	
		Loss of birdlife							
		Mosquito proliferation							
		Stripping of the landscape							
		Development of waterborne diseases							
		Reduction in agricultural production							
		Loss of income and impoverishment							

Table 18: Summary of the Risk Management Plan (RMP)

Project phases	Activities	Risks	Preventive measures	Implementation period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost (F CFA)
Preparatory phases of construction and project completion	<ul style="list-style-type: none"> - Installation of the building site - Bringing in construction equipment - Brushing - Construction of water supply canals in the perimeters to be irrigated and in the lowlands - Construction of the irrigation system consisting of primary, secondary and tertiary canals - Construction of the drainage system consisting of rainwater drainage channels as well as the emptying of the plots - Construction of a network of access tracks, services and 	Risk of soil pollution	<ul style="list-style-type: none"> - Raise awareness among employees about the harmful effects of soil pollution by waste oils, particularly used oil and hydrocarbons. - Do not spill waste oil, hydrocarbons and greases on the ground. - Carry out vehicle emptying operations on a watertight platform - Collect waste oil in leak-proof containers and hand it over to approved treatment companies. - Waterproofing the platforms where generators, fuel depots and hydrocarbon refuelling stations are installed and draining them to a de-oiling system for pollution abatement. - Drain runoff from concrete pads to a pH buffered settling pond. - List, locate and characterise the flow, the expected quality, the frequency of discharge of all sources of effluent and the points of outlet into the natural environment. 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Number of awareness-raising sessions - Percentage of people of people sensitized - Presence of a waterproofed emptying platform - Number of watertight containers - Presence of a de-oiling device - Presence of a settling tank - pH value - List, location, flow rate, expected quality and known discharge frequencies - Known Outlet Points 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site photos - Site visit - Site visit report 	Included in the contract of the works company

	facilities operation - Dismantling								
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Project phases	Activities	Risks	Preventive measures	Implementation period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost (F CFA)
Preparatory phases of construction and project completion	<ul style="list-style-type: none"> - Installation of the building site - Bringing in construction equipment - Brushing - Construction of water supply canals in the perimeters to be irrigated and in the shallows - Construction of the irrigation system consisting of primary, secondary and tertiary canals - Construction of the drainage system consisting of rainwater drainage channels as well as the emptying of the plots - Construction of a network of access tracks, services and facilities 	Risk of surface water pollution	<ul style="list-style-type: none"> - Raise awareness among employees about the harmful effects of soil pollution by waste oils, particularly used oil and hydrocarbons. - Do not allow oil, grease and oil spills to come into contact with run-off water. - Carry out vehicle oil change operations on watertight supports and entrust used oil to approved treatment companies. - Drain water run-off to a de-oiling device for pollution abatement and to a settling tank where the pH is buffered. 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Number of awareness-raising sessions - Percentage of people of people sensitized - Presence of a watertight platform - Used oil recovery contract - Presence of a de-oiling device - Presence of a settling tank - pH value 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site photos - Site visit - Site visit report 	Included in the contract of the works company
		Risk of disruption of customs and sexual deviance	<ul style="list-style-type: none"> - Sensitize the foreign labour force on the customs and habits of the localities in the project area. - Sanctioning staff members who violate local customs and practices. - Dismissing repeat offenders who have committed irresponsible acts that could damage the social harmony between the local population, the construction company and APRODAT. - Raise awareness among the populations of the neighbourhoods concerned by the project, especially women and girls, about the risks of changing behaviour with the negative externalities linked to the lure of easy profits. 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Number of awareness-raising sessions - Percentage of foreign workforce sensitized - Number of complaints handled - Number of persons sanctioned or dismissed - Percentage of population, women and girls sensitized 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - PV or awareness report - Site photos - Site visit - Site visit report 	See cost of measures against the risk of infection and spread of STIs and HIV/AIDS.

	operation - Dismantling								
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Project phases	Activities	Risks	Preventive measures	Implementation period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost (F CFA)
Preparatory phases of construction and project completion	<ul style="list-style-type: none"> - Installation of the building site - Bringing in construction equipment - Brushing - Construction of water supply canals in the perimeters to be irrigated and in the shallows - Construction of the irrigation system consisting of primary, secondary and tertiary canals - Construction of the drainage system consisting of rainwater drainage channels as well as the emptying of the plots - Construction of a network of access tracks, 	Risk of travel accident	<ul style="list-style-type: none"> - Set up and make available to workers a vehicle to shuttle and transport workers from an assembly point to the worksites - Raise awareness of workers about commuting accidents - Make workers aware of the need for vigilance when leaving the building sites and on their way from home to the building sites and back again. - Do not take detours when leaving home for construction sites or when returning home at the end of the working day. - Inform your supervisor when you have to make involuntary detours 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Presence of a shuttle vehicle - Number of awareness-raising sessions - Percentage of people reached - Number of detours after work - Number of recorded commuting accidents - Number of diversion information received by the supervisor 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Site photos - Site visit - Site visit report 	Included in the contract of the works company
		Risk of work accidents on the construction site	<ul style="list-style-type: none"> - Take out an all-risk insurance policy, covering workers on construction sites. - Equip employees with suitable personal protective equipment (PPE) and ensure that it is worn. - Hold weekly site safety meetings - Setting up first aid equipment - Training staff in first aid - Setting up an ambulance for the transfer of serious accidents to the nearest hospital - Signalling danger areas with signs and markers 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Insurance contract - Number and type of PPE - Number of people wearing PPE - Presence of first aid equipment - Number of training sessions - Number of people trained - Presence of an ambulance - Number of marked areas - Number of traffic signs 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site photos - Site visit - Site visit report 	2 500 000

	services and facilities operation - Dismantling								
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Project phases	Activities	Risks	Preventive measures	Implementation period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost (F CFA)
Preparatory phases of construction and project completion	<ul style="list-style-type: none"> - Installation of the building site - Bringing in construction equipment - Brushing - Construction of water supply canals in the perimeters to be irrigated and in the lowlands - Construction of the irrigation system consisting of primary, secondary and tertiary canals - Construction of the drainage 	Risk of traffic accidents	<ul style="list-style-type: none"> - Take out an insurance policy for construction sites and covering the workers. - Putting up temporary traffic signs - Raising awareness of road safety among workers and local populations - Regulating traffic (speed limits) when crossing populated areas - Checking the correct operation of the braking system and the reverse warning system of vehicles and construction machinery on a daily basis. - Raise truck drivers' awareness of compliance with the Highway Code and the company's internal rules and regulations. - Prohibit public access to construction sites - Provide a first aid centre - Training workers in first aid 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Insurance contract - Number of traffic signs - Percentage of people reached - Existence of rules of procedure - Operating status of the brake system and horn - Number of sensitised drivers - No public access to construction site signs - Number of trained workers 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Visual observation - Site photos - Site visit - Site visit report 	Included in the contract of the works company

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	<p>system consisting of rainwater drainage channels as well as the emptying of the plots</p> <ul style="list-style-type: none"> - Construction of a network of access tracks, services and facilities operation - Dismantling 	<p>Risk to the health of workers on the construction site</p>	<ul style="list-style-type: none"> - Raise workers' awareness of hygiene and health on the worksite - Provide employees with suitable PPE and ensure that they are worn properly. - Set up a functional care centre - Training staff in first aid - Signalling danger areas with signs and markers 	<p>At the time of the work</p>	<p>Promoter</p>	<p>ANGE</p>	<ul style="list-style-type: none"> - Number of awareness-raising sessions - Number and types of PPE distributed - Number of people wearing PPE - Existence of a care centre - Number of people trained - Number of marked areas - Number of panels 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Awareness-raising report - Visual observation - Site photos - Site visit - Site visit report 	<p>See costs of measures against the risk of accidents at work.</p>
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Project phases	Activities	Risks	Preventive measures	Implementation period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost
Preparatory	<ul style="list-style-type: none"> - Installation of the building site - Bringing in construction equipment - Brushing - Construction of water supply canals in the perimeters to be irrigated and in the shallows - Construction of 	Risk of contamination and spread of sexually transmitted infections	<ul style="list-style-type: none"> - Carry out information, education and communication campaigns at least every two months for workers on construction sites and the local population on the risks, dangers, consequences and appropriate preventive behaviour concerning sexually transmitted infections (STIs) in general and HIV/AIDS in particular. - Provide male and female condoms to all staff and labourers on the sites - Conducting screening and diagnostic tests as well as access to consultations organised under the aegis of the national programme dedicated to the fight against the disease HIV/AIDS of all staff and workers on construction sites - Assist any person declared HIV-positive by referring him/her to a specialised care centre. 	At the time of the work	Promoter	ANG E	<ul style="list-style-type: none"> - Number of awareness-raising meetings - Percentage of people reached - Number of condoms distributed - Number of reported cases of seropositivity - Number of people declared positive referred 	<ul style="list-style-type: none"> - Project environmental monitoring and audit report - Photos - Site visit - Site visit report 	8 000 000

phases of construction and project completion	the irrigation system consisting of primary, secondary and tertiary canals - Construction of the drainage system consisting of rainwater drainage channels as well as the emptying of the plots - Construction of a network of access tracks, services and facilities operation - Dismantling	Risk of contamination and spread of coronavirus infections	<ul style="list-style-type: none"> - Raise workers' awareness of the prevention and campaign against the pandemic, with the aim of raising awareness of possible risks and the seriousness with which employees take both precautionary and preventive measures. - Organize job site activities to avoid the junction of sub-sites and the excessive concentration of workers in one place to reduce the risk of possible internal infection. - Regularly disinfect the living quarters and shuttle vehicles to ensure a safe working environment. - Set up a functional hand washing facility at the entrance to the base with a staff member assigned to the operation of this facility. - Regularly distribute individual and collective sanitary protection equipment, including nose pads, to employees who must wear them to reduce the risk of possible internal infection. - Taking the temperature at the beginning and end of the day in front of the entrance gate for all employees and visitors 	At the time of the work	Promoter	ANGE	<ul style="list-style-type: none"> - Number of awareness-raising sessions - Percentage of people reached - Method of working - Frequency of disinfection - Existence of a functional hand washing facility - Frequency and number and type of equipment distributed - Number of people wearing nose pads - Existence of a thermometer and frequency of temperature measurement 	<ul style="list-style-type: none"> - Environmental monitoring and follow-up report of the project - Site photos - Site visit - Site visit report 	5 000 000
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Project phases	Activities	Risks	Preventive measures	Implementation period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost
Operation phase	- Irrigation of the plots - Use of inputs - Labour	Risk of soil pollution by hazardous solid waste	- Raising farmers' awareness of the harmful effects of empty insecticide containers - Recover empty containers and manage them in an environmentally friendly way through decontamination; - To train the population in the ecological management and reuse of decontaminated containers; - Burn previously cleaned cardboard, paper or plastic packaging or containers at a safe distance from homes and drinking water sources; - Bury all containers, cans, bottles etc. that have contained pesticides; - Fill the hole as quickly as possible	At the time of operation of the irrigated perimeters	Promoter	ANGE	- Number of awareness-raising sessions - Percentage of farmers sensitised - Quantity of containers recovered and decontaminated - Number of people trained - Quantity of burnt packaging or containers - Burning distance from dwellings and water sources - Quantity of containers that have contained buried pesticides - Quantity of holes plugged	- Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report	PM
		Risk of soil pollution from hazardous liquid discharges	- Do not pour the rest of the insecticide suspension directly onto the ground. - Safely dispose of the insecticide suspension by pouring it into a specially dug hole or a pit latrine after the operations. - Pour all water used for hand washing after treatment into a hole dug at least 100 metres from any watercourse, well or dwelling.	At the time of operation of the irrigated perimeters	Promoter	ANGE	- Spill site for insecticide suspensions - Disposal site of water used for washing hands	- Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report	PM

		Risk of surface water pollution	<ul style="list-style-type: none"> - Monitoring soil salinity and alkalinity as part of the research and development support programme. - To set up an awareness and technical support programme for the development of appropriate water and crop management practices that promote the drainage of plots after rice cultivation. - Periodically wash the land with abundant irrigation, followed by systematic drainage to dilute the salts; - Periodically analyse the water of the rivers upstream and downstream of the irrigated perimeters. 	At the time of operation of the irrigated perimeters	Promoter	ANGE	<ul style="list-style-type: none"> - Frequency of salinity and alkalinity monitoring - Existence of a programme - Number of awareness-raising sessions - Percentage of people reached - Frequency of leaching - Frequency of surface water analysis - Water quality upstream and downstream of the perimeters 	<ul style="list-style-type: none"> - Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report 	PM
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Project phases	Activities	Risks	Preventive measures	Period from implementation	Responsible of implementation	Responsible for control and monitoring	Monitoring indicators	Means of verification	Cost
Operation phase	- Irrigation of the plots - Use of inputs - Labour	Risk of pollution and groundwater contamination	- Periodically analyse the quality of water from boreholes and control wells in the irrigated perimeters. - Setting up a drinking water supply system in the localities of the irrigated perimeters - Raise awareness of the need to avoid the frequent use of surface water for drinking.	At the time of operation of the irrigated perimeters	Promoter	ANG E	- Frequency of groundwater analysis - Groundwater quality - Existence of a drinking water supply system - Number of awareness-raising sessions - Percentage of people reached	- Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report	PM
			General provisions - To implement, in general, Education, Information and Communication (IEC) programmes on water and malaria diseases and hygiene measures. - To draw up and implement a socio-educational and sanitary programme and a plan for the control and monitoring of pathologies linked to the presence of water in the project area on a permanent basis.	At the time of operation of the irrigated perimeters	Promoter	ANG E	- Existence of programmes - Number of awareness-raising sessions - Percentage of people reached	- Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report	PM

		<p>Risk of damage to the health of the population</p> <p><i>In terms of malaria development</i></p> <ul style="list-style-type: none"> - Raise awareness about hygiene and health - Fight against mosquito habitats in and around houses: boxes, empty jerry cans or any object that can contain water and shelter malaria vectors. - Subsidize the purchase of impregnated mosquito nets for the populations in the project area or - Establish a link with the Ministry of Health to include the project area in the LLIN Programme for the free distribution of mosquito nets. - Assisting the health centres of Broukou and Léon with medicines generic antimalarial drugs and other measures 	<p>At the time of operation of the irrigated perimeters</p>	<p>Promoter</p>	<p>ANG E</p>	<ul style="list-style-type: none"> - Number of awareness-raising sessions - Percentage of people reached - Quantity and type of objects that can be used as mosquito houses - Prices of mosquito nets - Number of mosquito nets distributed - Malaria prevalence rate in the area - Number of cases of medical consultations related to malaria - Quantity of medicines 	<ul style="list-style-type: none"> - Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report 	<p>PM</p>
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Project phases	Activities	Risks	Preventive measures	Implementation period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost
Operation phase	- Irrigation of the plots - Labour	Risk of damage to the health of the population	<p><i>With regard to the development of bilharziasis</i></p> <ul style="list-style-type: none"> - Raise awareness among the population not to stay in the stagnant water of the irrigated perimeters for too long and too regularly, especially for children. - To protect water from contamination by human and animal urine and faeces. - Raise awareness among the population (especially children) so that they do not bathe in the stagnant water of the irrigated perimeters. - Do not use pesticides against gastropods because of the enormous toxicity of these inputs. - Providing the health centres of Broukou and Léon with medicines to treat bilharziasis. 	At the time of operation of the irrigated perimeters	Promoter	ANGE	<ul style="list-style-type: none"> - Number of awareness-raising sessions - Percentage of people reached - Length of stay in the water - Prevalence rate of bilharziasis - Number of cases of medical consultation related to bilharziasis - Method for controlling gastropods - Quantity of medicines 	<ul style="list-style-type: none"> - Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report 	PM
		Risk of occupational accidents for farmers	<ul style="list-style-type: none"> - Train and raise awareness among farmers on the risks of accidents in irrigated areas; - Train and raise awareness among farmers in the use of farming tools, including ploughs and other equipment that can cause accidents on farms; - Raise awareness among farmers to have a medical kit for minor injuries. 	At the time of operation of the irrigated perimeters	Promoter	ANGE	<ul style="list-style-type: none"> - Number of training and awareness sessions - Percentage of people trained and sensitised - Percentage of farmers with a medical kit 	<ul style="list-style-type: none"> - Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report 	PM
			<i>At the level of packaging labelling</i>						

		<p>Risk of poisoning for farmers and the population</p>	<ul style="list-style-type: none"> - Raising farmers' awareness on packaging and labelling methods - Packaging and labelling of pesticides in accordance with WHO standards. The label must be written in French, with pictograms; it must indicate the contents, the safety instructions (warning) and any measures to be taken in case of accidental ingestion or contamination. - Always leave the product in its original container. 	<p>At the time of operation of the irrigated perimeters</p>	<p>Promoter</p> <ul style="list-style-type: none"> - Farmers - Producer groups - CVD/CCD 	<p>ANGE</p>	<ul style="list-style-type: none"> - Number of awareness-raising sessions - Percentage of people aware of the packaging and labelling method - Method of packaging and labelling of pesticides - Place of storage of the product 	<ul style="list-style-type: none"> - Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report 	<p>PM</p>
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VOLUME 2.2 : IDENTIFICATION, EVALUATION OF ENVIRONMENTAL IMPACTS AND RISKS, ELABORATION OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (PGES)
AND THE RISK MANAGEMENT PLAN (PGR) FOR THE DEVELOPMENT OF LOWLAND IRRIGATED AREAS.

Project phases	Activities	Risks	Preventive measures	Implementation period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost
		Risk of poisoning for farmers and the population	<i>In terms of storage and transport</i> <ul style="list-style-type: none"> - Raising farmers' awareness on pesticide conservation - Keep pesticides in appropriate shops that can be locked and are not accessible to unauthorised persons or children. - Under no circumstances should pesticides be kept in a place where they could be mistaken for food or drink; - Keep pesticides dry but out of the sun. - Do not transport pesticides in a vehicle also used for transporting food. 	At the time of operation of the irrigated perimeters	<ul style="list-style-type: none"> - Promoter - Farmers - Producer groups - CVD/CCD 	ANGE	<ul style="list-style-type: none"> - Number of awareness-raising sessions - Percentage of people aware of the conservation of pesticides - Pesticide storage sites - Means of transport of pesticides - Number of farmers using appropriate storage and transport methods - Number of cases of intoxication 	<ul style="list-style-type: none"> - Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report 	PM
			<i>With regard to the elimination of the insecticide suspension</i>						

Operation phase	<ul style="list-style-type: none"> - Irrigation of the plots - Labour 	Risk of poisoning for farmers and the population	<ul style="list-style-type: none"> - Raising farmers' awareness of the elimination of insecticide suspension - Safely dispose of the insecticide suspension by pouring it into a specially dug hole or a pit latrine after the operations. - Do not dispose of a pesticide by throwing it in a place where it may contaminate water used for drinking or washing or reach a watercourse. - Dig a hole at least 100 metres from any watercourse, well or dwelling. - Pour all the water used for hand washing after treatment. - Bury all containers, cans, bottles etc. that have contained pesticides. - Fill the hole as quickly as possible - Burn previously cleaned cardboard, paper or plastic packaging or containers at a safe distance from homes and drinking water sources. 	At the time of operation of the irrigated perimeters	<ul style="list-style-type: none"> - Promoter - Farmers - Producer groups - CVD/CCD 	ANGE	<ul style="list-style-type: none"> - Number of awareness-raising sessions - Percentage of people reached - Places and methods of suspension removal - Number of farmers using appropriate disposal methods - Number of cases of intoxication 	<ul style="list-style-type: none"> - Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report 	PM
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Project phases	Activities	Risks	Preventive measures	Implementation period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost
Operation phase	- Irrigation of the plots - Labour	Risk of poisoning for farmers and the population	<p><i>In terms of cleaning empty pesticide packaging and containers</i></p> <ul style="list-style-type: none"> -- Raising farmers' awareness of cleaning methods for empty packaging and containers - Discourage the reuse of empty pesticide containers - Under no circumstances should containers that have contained pesticides classified as very dangerous or extremely dangerous be reused. - Do not reuse containers made of materials such as polyethylene, which preferentially absorb pesticides, if they have contained pesticides whose active ingredient is classified as moderately, very or extremely hazardous. - Rinse a container as soon as it is empty, then fill it completely with water and leave it to stand for 24 hours. Then empty it and repeat the operation twice. 	At the time of operation of the irrigated perimeters	<ul style="list-style-type: none"> - Promoter - Farmers - Producer groups - CVD/CCD 	ANGE	<ul style="list-style-type: none"> - Number of awareness-raising sessions on cleaning methods for pesticide packaging and containers - Percentage of people reached - Methods of cleaning, - Number of farmers using appropriate cleaning methods - Number of cases of intoxication 	<ul style="list-style-type: none"> - Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report 	PM

			<p><i>At the level of Individual Protection</i></p> <ul style="list-style-type: none"> - Raising farmers' awareness of general hygiene after the use of pesticides - Wearing coveralls or a long-sleeved shirt over trousers, a wide-brimmed hat, turban or other headgear, and boots or heavy shoes - Do not wear sandals - Protect your mouth and nose with a simple means such as a disposable paper mask. The masks must comply with the European Union's EN 140 protection standards, i.e. a class 2 gas/vapour filter corresponding to a pollutant filtering concentration of < 0.5%, or 5,000 ppm - Change the mask as soon as it is wet. - Ensuring that protective masks are worn effectively - Wear cotton clothes for easy washing and drying. These clothes should cover the body and not have any openings. 	At the time of operation of the irrigated perimeters	<ul style="list-style-type: none"> - Promoter - Farmers - Producer groups - CVD/CCD 	ANGE	<ul style="list-style-type: none"> - Number of awareness-raising sessions - Percentage of people reached - Type of individual protection applied - Number of people wearing personal protective equipment 	<ul style="list-style-type: none"> - Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report 	PM
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Project phases	Activities	Risks	Preventive measures	Implementation period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost
Operation phase	- Irrigation of the plots - Labour	Risk of poisoning for farmers and the population	<i>In the preparation of suspensions</i> - Train and raise awareness among farmers in the preparation of suspensions - Wear gloves, an apron and eye protection, such as a face shield (face shields protect the entire face and keep cooler) or goggles, in addition to protective clothing. - Cover your mouth and nose as indicated for indoor treatments. - In addition, take care not to touch any part of your body with gloves while handling pesticides.	At the time of operation of the irrigated perimeters	- Promoter - Farmers - Producer groups - CVD/CCD	ANGE	- Number of training and awareness-raising sessions on the preparation of suspensions - Percentage of people reached - Methods of cleaning - Type of individual protection applied - Number of farmers wearing personal protective equipment - Number of cases of intoxication	- Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report	PM
			<i>In terms of clothing care</i> - Raising farmers' awareness on clothing care - Always keep protective clothing in perfect condition; - Carry out periodic checks to ensure that there are no tears or wear and tear on the fabric that could lead to contamination of the fabric. the epidermis. - Wash protective clothing and equipment daily with soap and water, separately from other clothing; - Replace gloves as soon as they are torn or show signs of wear. Gloves require special care; - Rinse gloves with plenty of water after use before removing them;	At the time of operation of the irrigated perimeters	- Promoter - Farmers - Producer groups - CVD/CCD	ANGE	- Number of awareness-raising sessions - Percentage of people reached - Applied clothing care methods - Number of farmers looking after their clothes - Number of cases of intoxication	- Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report	PM

			- Wash gloves outside and inside at the end of each working day.						
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Project phases	Activities	Risks	Preventive measures	Implementation period	Responsible for implementation	Control and monitoring manager	Monitoring indicators	Means of verification	Cost
Operation phase	- Irrigation of the plots - Labour	Risk of poisoning for farmers and the population	<i>At the level of knowledge and mastery of methods use of inputs and protective measures</i> - Train and raise awareness of all users of hazardous agricultural inputs, including farmers, by an environmental toxicology expert or agronomist.	At the time of operation of the irrigated perimeters	- Promoter - Farmers - Producer groups - CVD/CCD	ANGE	- Number of training and awareness-raising sessions on knowledge and mastery of input use methods and protective measures - Percentage of people reached	- Monitoring and environmental audit report of the project - Photos - Site visit - Site visit report	PM
End of project phase	Cession	Risk of soil pollution by hazardous solid waste Risk of soil pollution from hazardous liquid discharges Risk of surface water pollution Risk of pollution and groundwater contamination Risk of damage to the health of the population Risk of occupational accidents on farms Risk of poisoning for farmers and the population	- Continue by implementing the preventive measures applied in the exploitation phase	At the time of the operation of the mini-dams after cession	Dealer	ANGE	Same monitoring indicators as in the operation phase	Same means of verification	PM

Project phases	Activities	Risks	Preventive measures	Period of implementation work	Person in charge of implementation work	Control manager and follow-up	Monitoring indicators	Means of verification	Cost
End of project phase	Abandonment	Risk of soil pollution by hazardous solid waste	- Continue by implementing the preventive measures applied in the exploitation phase	Abandoned	Promoter	ANGE	Same monitoring indicators as in the operation phase	Same means of verification	PM
		Risk of soil pollution from hazardous liquid discharges					- Design and construction of new mini-dams - Carrying out an ESIA	- Technical files of the new mini-dams - ESIA Report - Environmental compliance certificate	
		Risk of surface water pollution							
		Risk of pollution and groundwater contamination							
		Risk of damage to the health of the population	- Study the possibility of a rapid reconstruction of the residence in relation to the needs of the moment. - Undertake the same administrative procedures for the elaboration of the Environmental and Social Impact Assessment.						
		Risk of occupational accidents on farms							
		Risk of poisoning for farmers and the population							

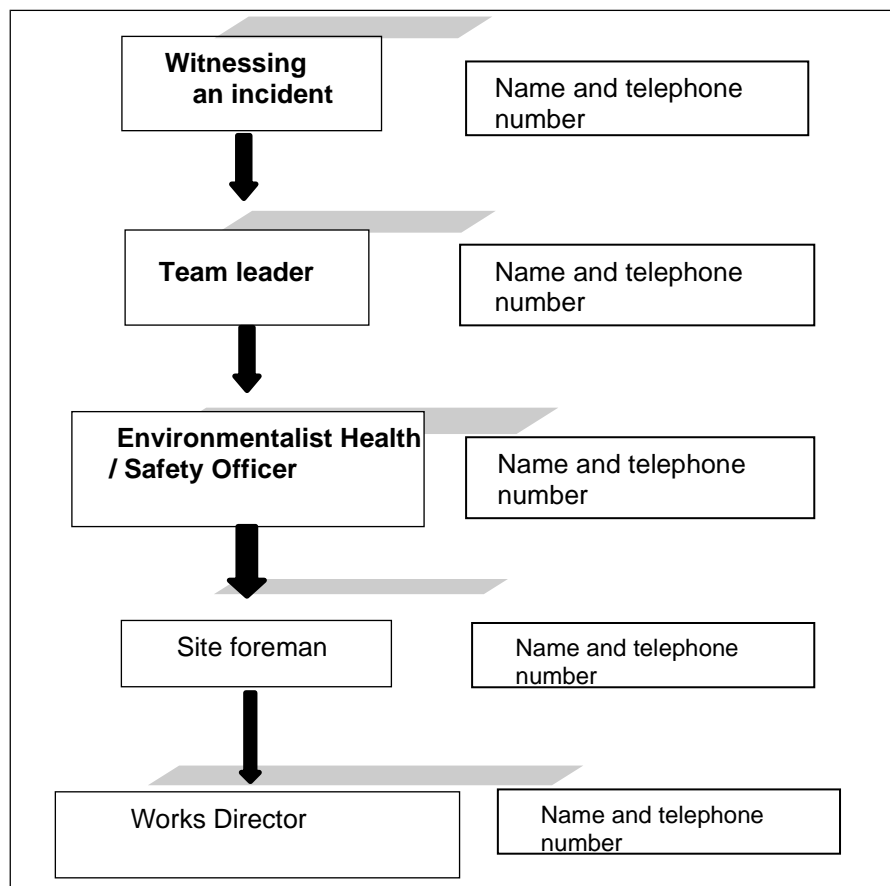
4.4. RESPONSE AND COMMUNICATION PLAN IN THE EVENT OF NON-COMPLIANCE

When unexpected results in terms of non-compliance emerge, a severity scale will be established and will allow for more effective communication of their importance and rapid prioritisation of cases to be dealt with. For this purpose, the following levels of non-compliance should be distinguished:

- Level I : A non-compliance situation that does not meet the original requirements but which should not pose an immediate threat to an identified important resource;
- Level II: A situation of non-compliance that has not yet resulted in clearly identified damage or irreversible impact on a sensitive or important resource, or on the safety and health of workers, company personnel in charge of the works and the population, but which requires rapid corrective action and site-specific attention to avoid these effects;
- Level III: A critical non-compliance situation in which there is damage to a sensitive resource that is specifically protected where there is a reasonable expectation of imminent harm or damage to the health and safety of workers, company personnel carrying out the work and the public.

Figure 3 shows the chain of communication between the different actors involved in surveillance.

Figure 3: Typical communication chain in case of non-compliance



4.5. COMPLAINT MANAGEMENT SYSTEM

4.5.1. INTRODUCTION

Project implementation may be subject to several types of complaints and sources of conflict that may arise during the implementation and operation of projects for various reasons:

- *Social impact during the works*: temporary occupation of private land, restriction of access to shops, housing, disruption of socio-economic activities, traffic disruption, risk of accidents, etc.
- *Environmental impacts during the works*: release of dust, bad smells, noise and odour nuisance, vibration, deterioration of the living environment, landscape, production and accumulation of construction site waste, etc.

Faced with these problems that may affect his health, well-being, movable and immovable property, income, etc., the normal reaction of a citizen is to lodge a complaint, claim and defend his rights by using the rights of recourse provided by law. However, this is not within the reach of everyone, especially the poor and most deprived class, which justifies the establishment of an adequate mechanism for managing and dealing with the grievances of complainants during the construction of mini-dams.

4.5.2. RECOMMENDED MECHANISMS

In the course of project implementation, the public should be well informed about the mechanism, rules and procedures for handling complaints and appeals. This information should be disseminated to all actors and at all levels to enable the complainant to become familiar with it and to use it when necessary.

4.5.2.1. Improved monitoring and processing of complaints

The promoter will ensure that the system for receiving and monitoring claims and complaints is improved in order to avoid several problems in advance and to improve the acceptability of the project. It will continue its current approach of trying to resolve all disputes amicably. In order to achieve this objective, it will exercise more control over companies and more educational and relational efforts with people who file complaints. Special attention will be given to complaints and claims from the elderly, women, the poor, the sick, etc.

4.5.2.2. Limitation of potential causes of complaints during the works

Each company contracted by the promoter to carry out the works will periodically inform and raise the awareness of its staff and personnel of the rules of good practice to limit the nuisance and disruption likely to be generated during the works.

Each company will be required to post contact addresses and communicate them to the public through the DTCs and CCDs in a legible manner throughout the performance period. These contact addresses must include: a telephone number and an email address.

4.5.2.3. Public information

In addition to the information posted at the site of the work, other posters will be placed, as appropriate, in the village chiefs' offices, giving the public information on the project (nature of the work, location, duration, work undertaking, etc.), the addresses and telephone numbers of the entity to which an affected person can address a complaint and the steps to be taken in the event that he or she does not obtain satisfaction after a given period of time (maximum two weeks).

For the construction works of the irrigated perimeters, the population can file complaints at one of the following addresses:

- Mission of control and supervision of works representing the promoter ;
- Village chiefs ;
- Heads of canton ;
- Prefecture ;
- Commune of Doufelgou 2 ;
- Regional Directorate of Environment and Forest Resources of the Kara Region (DRERF-Kara)
- National Environment Management Agency (ANGE) in Lomé.

4.5.2.4. Registration of complaints

At one of the above-mentioned addresses, all complaints received will be registered (a register will be opened for this purpose) whether by telephone, email or post directly from the complainant or through the municipalities. (See model complaint registration form).

- Amicable resolution mechanism

A person in charge of the control and monitoring mission, the secretaries of the village and canton chiefs, a person in charge at DRERF-Kara or ANGE will ensure the processing of complaints by promoting the amicable settlement of conflicts that may arise because of the works or in the course of exploitation no later than two weeks after the complaint has been lodged.

Where appropriate and as a last resort, if all possible attempts at settlement have been exhausted, the applicant may bring the matter before the courts.

- Administrative provisions and recourse to the courts

Recourse to the courts, although it is not recommended for the smooth running of the project (risk of blockage, work stoppage, delays, etc.) remains the solution of last resort in the event of failure of the amicable solution.

- Analysis and synthesis of complaints

In order to further improve this process, and for archiving purposes, those responsible for registering complaints will periodically analyse the complaints received, the handling of these complaints, and the responses given to these complaints. Periodic summary reports and a report at the end of the work will be drawn up. They will include the necessary statistics and comments as well as proposals for improvement in the social management of the projects in the future.

Model complaint registration form

Project :
Name of the complainant :
Address :
Date of complaint:
Object of the complaint :
Description of the complaint :

Proposal Mission to control and supervise the works/Head of village/County Head/ Prefecture/Commune/ DRERF-Kara /ANGE for an amicable settlement Date :
The complainant's response : Date :

RESOLUTION Date :
Supporting documents (Minutes, Contract, Agreement,)

4.6. **COSTS OF ENVIRONMENTAL MEASURES**

Tables 19 to 21 present the overall budget and costs of the environmental measures for each phase of the project, which are: *fifty-six million sixty-seven thousand (56 067 000) F CFA*. This amount includes: *fifty million nine hundred and seventy thousand (50 970 000) F CFA* for the environmental measures and a provision of *five million ninety seven thousand (5 097 000) F CFA* for the convention for monitoring and control by ANGE of the implementation of the PGES and the PGR during the construction phase.

Costs related to compensation and resettlement of affected persons are included in the Resettlement Action Plan (RAP).

Table 19: Overall budget of the ESMP in the preparatory and construction phases

N°	DESIGNATION	AMOUNT (F CFA)
1	Summary of the costs of environmental measures in the preparatory and construction phases	50 970 000
2	Provision for monitoring and control of the ESMP by ANGE	5 097 000
TOTAL		56 067 000

Table 20: Summary of costs of environmental measures in the preparatory construction phases

N°	DESIGNATION	AMOUNT (F CFA)
1	Compensatory reforestation	21 470 000
2	Solid waste management	1 500 000
3	Preventing the risk of occupational accidents and damage to the health of staff working on the project	15 000 000
4	Preventing the risks of contamination and the spread of sexually transmitted infections	8 000 000
5	Prevention of the risks of contamination and spread of coronavirus infections	5 000 000
GENERAL TOTAL		50 970 000

Table 21: Provision for monitoring and control by ANGE during the construction phase

N°	DESIGNATION	AMOUNT (F CFA)
1	10% of the costs of environmental measures	5 097 000
TOTAL		5 097 000

5- ENVIRONMENTAL AND SOCIAL CLAUSES BOOK

The present clauses are intended to help the Company in charge of carrying out the construction works of the mini-dams, so that it can integrate in these documents prescriptions allowing to optimise the protection of the environment and the socio-economic environment.

In addition, they are specific to all site activities that can be a source of environmental and social nuisance. However, it remains true that it is not possible to envisage all possible cases and that the clauses proposed should serve as a guide and in no way replace the environmental and social impact assessment of the project.

I. General rules

The Company shall respect and apply the laws and regulations on the environment existing and in force in Togo. In the daily organisation of its worksite, it must take all appropriate measures to minimise environmental damage, applying the provisions of the contract and ensuring that its personnel respect and apply them as well.

1.1. Implementation programme

The Company shall draw up and submit to the Client for approval a detailed final environmental and social management programme, including the following indications:

- **Environmental and Social Management Plan for the Construction Site (PGESC)**

The Company is required to provide an Environmental and Social Site Management Plan (ESMP) within 30 days from the date of notification of the contract. The CSMP must be approved by the Client within 15 days. As a minimum, the PGESC will include

- The organisation chart of the personnel assigned to environmental management with an indication of the environmental manager of the project,
- The description of methods for reducing impacts on the biophysical and socio-economic environment,
- The description of risk prevention methods related to the project on the biophysical and socio-economic environment,
- The water and sanitation management plan,
- The waste management plan,
- The list of agreements made with the owners and current users of these areas and evidence that these users have been able to find similar areas to continue their activities.
- All site protection measures and implementation programme;
- The location and general plan of the site to scale,
- Health infrastructures and access for populations in case of emergency,
- The site's internal regulations concerning environmental protection and safety,
- The provisional development plan for the site at the end of the works.

The Undertaking is obliged to subcontract to special operators the works and activities not falling within its competence, namely :

- Tree plantations ;
- Activities to raise staff awareness of the risks of STI/HIV/AIDS transmission and transgression of customs and habits.

It will take care not to compromise the water supply of local populations. To this end, the Company must submit its plans for the development and operation of water points for the works to the Engineer for approval. If, in the opinion of the Engineer, pumping at an approved site results in a

significant reduction in the flow rate from wells and springs in the vicinity, the Company shall supply the populations concerned with water of equivalent quantity and quality.

Where, in the opinion of the Engineer, water withdrawals result in a significant reduction in the flow available to downstream users, the Company shall create, at its own expense, a top-up of water of equivalent quantity and quality.

This plan will include all adequate provisions for the disposal of waste water and refuse so that no pollution or danger to human or animal health results.

These arrangements will be effectively maintained throughout the work period.

1.2. Safety on building sites

The Company shall be subject to the special health and safety regimes defined by the regulations in force in Togo. It will organise a routine and emergency medical service at the life base, adapted to the number of its staff. In addition, it shall have a safety coordinator in its team who will ensure maximum safety on the site and in the living base, both for the workers and for the population and other persons in contact with the site.

1.3. Safeguarding riverside properties

The Company shall, under the control of the Engineer, clean up and eliminate at its own expense any form of pollution due to its activities and compensate those who have suffered the effects of such pollution.

The use of petroleum products to eliminate dust in the living quarters or anywhere else on the site is strictly forbidden.

During dry periods, the Company should regularly water the roads used by its transport vehicles and machinery to avoid dust rising, particularly in the areas of the city.

1.4. Traffic obstructions

The Company must constantly maintain traffic and access for local residents during the works. The local residents concerned are those whose habitat existed before the market was notified.

The maintenance of the worksites during the night will be subject to the project owner's authorisation. If the Company has received authorisation or an order to carry out work during the night, it will undertake to carry out the work in such a way as not to cause any disturbance to the inhabitants and establishments near the worksite. The method of lighting must be subject to the Engineer's approval.

The Company will have to enforce a speed limit for all its vehicles on the public highway. This should be set at a maximum speed of 80 km/h in the open country, 40 km/h in built-up areas and 20 km/h at work sites. Drivers exceeding these limits will be subject to disciplinary measures that may go as far as dismissal.

The Company's vehicles must in all circumstances comply with the provisions of the Highway Code in force in Togo and more particularly with the texts and regulations concerning the weight of laden vehicles.

1.5. Discoveries

Any discovery on the worksite of minerals, fossils, coins, valuables and other remains or objects of geological or archaeological interest shall be deemed, in the relations between the Company and the Client, to be the absolute property of the latter. The Company shall take all reasonable precautions to prevent its workmen or any other person from taking or damaging such items and shall, as soon as they are discovered and before their removal, inform the Engineer of such discovery and shall carry out, at the Employer's expense, the Engineer's orders concerning the arrangements to be made.

1.6. Journal of works

The work log will also include all records of any shortfalls or incidents that have resulted in a significant impact on the environment or an accident or incident with the population and the precise corrective measures.

1.7. Obligations under the guarantee

The Company is obliged, for the duration of the guarantee period for the project, to carry out routine maintenance of the works carried out and to remedy any negative impacts that may be observed, such as erosion or landslides caused by the rainy season.

1.8. Final acceptance

The Company's obligations run until the final acceptance of the works, which will only be acquired once the environmental improvement works provided for in the contract have been completed.

II. Technical requirements

2.1. Site installation

2.1.1 Location

The site installation plan will need to take into account the facilities and will be determined by the volume and nature of the work to be carried out, the number of workers and the environmental standards and protection measures.

2.1.2 Rules of procedure

For the installation of the building site, an internal regulation must specifically mention :

- the obligation to comply with work safety measures (wearing helmets or turbans, boots, gloves, etc.) during operations;
- safety rules (vehicle speed limited to 80 km/h in open country, 40 km/h in built-up areas and 20 km/h at the work site);
- the prohibition of alcohol or cigarette consumption during working hours;
- the obligation to respect the customs and habits of populations and human relations in general;
- prohibiting foreigners, especially women, from entering the construction site from 8 p.m. onwards to reduce the risks of debauchery and the spread of STIs and AIDS. Consequently, the regulations must clearly mention the closure of the base from 10 p.m. onwards.

The rules of procedure must be clearly explained and provided to each worker when they are hired. Information and awareness-raising sessions should be held regularly as work progresses. The rules of procedure should also place great emphasis on compliance with the development plan and penalties should be included to deter possible temptations.

2.1.3 Equipment

Office areas should be provided with sanitary facilities (latrines, septic tanks, cesspools, etc.) according to the number of workers. Water tanks should be installed in sufficient quantity and quality and adequate to the needs. A drinking water tank must be installed and the volume must correspond to the needs.

2.1.4 Building site congestion and waste management

During the performance of the work, the Company shall ensure that the site is not unnecessarily congested and shall store or dispose of construction equipment and excess materials, and shall clear and remove from the site any debris, litter or Temporary Work that is no longer required.

Receptacles with lids will be installed at the various activity sites to receive waste. To facilitate waste management, the implementation of a source separation system will be recommended. Thus, the Company, in collaboration with the control mission, will have to make a typology of inert waste (which can be unloaded in a local landfill) and hazardous waste (requiring special treatment) and install several receptacles receiving the various types of waste.

These receptacles will be emptied periodically in authorised landfills under the supervision of the environmental expert in charge of supervising the works.

The areas for maintenance and washing of the machines must be well delimited and the volumes of polluted materials (sand for example) must be removed.

In particular, used oils and fats can be sent to companies specialising in recovery, such as SRH.

Hazardous waste, if any, will have to be recovered separately and treated separately.

Solid waste management will be carried out in accordance with the provisions of Law N° 2008-005 of 30 May 2008 on the Environment Framework Law.

2.1.5 Protection of the environment against noise

The contractor is obliged to limit the noise from the building site which may seriously disturb local residents by :

- strict adherence to the duration of the work;
- a precise definition of working hours ;
- regular maintenance of the machines;
- control by the engineer of all activities likely to generate noise.

2.1.6 Protection of the environment against exhaust fumes and hydrocarbons

Any depots and other storage facilities for fuel, lubricants or hydrocarbons, as well as the maintenance facilities for the Company's equipment, must comply with the requirements relating to these types of facilities. They must be strictly limited to predefined areas.

The filling areas of the tanks of the machines could be waterproofed to limit the infiltration of hydrocarbons. Soil and all objects soiled by hydrocarbons must be recovered and stored in watertight containers which will be unloaded in suitable places at the end of the work.

The contractor is also required to bring equipment in good condition to the site and to ensure that it is regularly maintained, in order to limit the risk of pollution as much as possible.

2.1.7 Environmental protection against dust and other solid particles

The Company is required to water sources of dust emissions (material depots, truck loads, excavated material, embankments, diversion roads, etc.). Also, the load of the supply trucks must be limited to the level of the boxes and covered according to the regulations in force, to reduce air pollution (dust flight) and the risk of falling materials along the routes.

2.1.8 Surface and groundwater protection

In order to avoid this pollution, the work should, as far as possible, be carried out during the dry season and the site restored before the start of wintering.

In addition, the Company shall avoid any spillage or discharge of substances likely to pollute surface or ground water (by infiltration or runoff). The installations must be located at an optimal distance from ravines and other temporary watercourses in order to limit the risks of water pollution.

The maintenance and washing areas of the machines must be concreted and provided with a sump for collecting oils and greases. This maintenance area should have a slope towards the

sump and towards the inside of the platform in order to avoid the flow of polluting products towards unprotected floors.

Used oils are to be managed in accordance with Law N° 2008-005 of 30 May 2008 on the Environment Framework Law. The Company must sign a contract with its fuel and lubricant suppliers for the recovery of used oils.

2.1.9 Construction site withdrawal

The site must provide for adequate water drainage over its entire surface.

At the end of the works, the Company will carry out all the work necessary to restore the premises. The Company shall fold up all its equipment, machinery and materials. It may not abandon any equipment or materials on the site or in the surrounding area.

If it is in the interest of the project owner or of a local authority to recover the fixed installations for future use, the project owner may ask the holder to transfer the installations subject to demolition during the withdrawal without compensation.

After 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.

2.2. Kick-off meeting

The municipal authorities and the population will have to be informed about the consistency of the work that will be carried out and this will be the place to gather any comments from them. The information on the works will have to specify the routes and locations likely to be affected by the works and their duration. The Company may, with the help of local NGOs, further raise awareness of the environmental and social aspects of the worksite and the human relations between the Company's workers and the population.

2.3. Site personnel

2.3.1. Job creation

The Company is obliged to hire (apart from its technical management staff) as many workers as possible in the area where the work is carried out. If qualified personnel cannot be found on site, the Company is authorised to hire labour outside the work area.

The Enterprise will have to recruit an environmental expert for the implementation of the CSMP.

2.3.2. Safety and health of workers

➤ General provisions

- Take out an insurance policy for the construction site covering staff and workers ;
- Hold regular site meetings on hygiene and health for workers;
- Distributing Personal Protective Equipment (PPE) (harnesses, dust masks, gloves, helmets and construction site or sports shoes);
- Insist on the wearing of PPE by workers ;
- Sanction, or even poach workers who do not respect environmental and safety measures on the site, particularly the wearing of PPE.
- Putting in place first aid equipment ;

- Training staff in first aid;
- Mark danger zones.

➤ **Distribution of protective equipment :**

Personal protective equipment provides the worker with an additional degree of personal protection. The table below presents examples of occupational hazards and the types of personal protective equipment available for different applications.

Recommended measures for the use of personal protective equipment in the workplace include the following:

- Actively use personal protective equipment when alternative technologies, procedures or work plans cannot eliminate, or sufficiently reduce, a risk or exposure,
- Identify and provide personal protective equipment that offers adequate protection to the worker, co-workers and occasional visitors, without unnecessarily harming the individual,
- Maintain personal protective equipment properly, including cleaning when dirty, and replacement when damaged or worn. The proper use of personal protective equipment should be part of periodic training programmes for staff.

Summary of Personal Protective Equipment (PPE) recommended according to risk

Objective	Workplace risks	Recommended personal protective equipment
Eye and face protection	Flying particles, molten metal, molten chemicals, gases or vapours, light radiation	Safety glasses with side shields
Head protection	Falling objects, free height insufficient, and overhead power cables	Plastic helmets with top and side protection
Hearing protection	Noise, ultrasound	Hearing protection (earmuffs, earmuffs, earmuffs, etc.)
Foot protection	Falling or rolling objects; sharp objects, corrosive or hot liquids	Safety shoes and boots for protection against falling or moving objects, the liquids and chemicals
Hand protection	Hazardous materials, cuts or lacerations; vibrations; extreme temperatures	Rubber or synthetic (neoprene) gloves leather, steel, insulating material
Breathing protection	Dust, vapours, fumes, mists, gases, smoke	Masks equipped with suitable filters for dust removal (European Union EN 140 protection standards, i.e. filtering of FFP1 to FFP2 corresponding to 4 times the VME and 10 times the VME respectively) and air purification (chemicals, mists, vapours and gases - Standards of protection EN 140 of the European Union, i.e. a class 2 gas/vapour filter corresponding to a pollutant filtering of concentration < 0.5% or 5,000 ppm-).

Body / leg protection	Extreme temperatures, hazardous materials, biological agents, cuts and lacerations.	Insulating garments, coveralls, aprons etc. made of suitable materials.
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➤ **First aid**

- Provide for the establishment of appropriately equipped first-aid posts.
- Set up rescue procedures in remote posts, for cases of trauma or serious illness, until the victim can be transferred to an appropriate medical centre.

➤ **Workplace health and safety training**

- Provide orientation training in health and safety in the workplace for all new staff members to ensure that they have a basic knowledge of the regulations governing work in the establishment, for their personal protection and for the prevention of accidents affecting their colleagues. This training will include knowledge of basic risks, risks specific to the establishment, safe working methods and rescue procedures in the event of fire, evacuation and natural disasters, as required,

➤ **Training employees for new jobs and subcontractors**

- Ensure that, before taking up new functions, its staff and suppliers/contractors have received training and information that will enable them to understand the risks inherent in their functions and to protect their health against hazardous environmental factors that may be present.

This training must provide adequate knowledge of the following areas:

- Knowledge of materials, equipment and tools,
- Risks specific to the operations/activities carried out and mitigation measures,
- Potential health risks,
- Precautions for the prevention of exposure,
- Hygiene requirements,
- Wearing and use of protective equipment and clothing,
- Appropriate response to extremes in operations, as well as to incidents and accidents.

➤ **Risk of contamination and spread of STIs/AIDS**

The Company shall carry out campaigns to raise workers' awareness of the risk of contamination and the spread of STIs/AIDS.

During the awareness-raising sessions, the Company will also have to include topics relating to respect for the customs and habits of the localities in the project area, road safety and environmental protection.

2.3.3. Local festivals and customs

In all its dealings with the workforce in its service, the Company shall take due account of all public and non-working holidays, official holidays and religious or other customs.

2.3.4. Epidemics

In the event of a declaration of an epidemic disease, the Company shall observe and enforce all regulations, orders and stipulations issued by the government or local medical or health

authorities to deal with and remedy the situation.

2.3.5. Maintaining order

The Company shall at all times take all useful precautions to prevent any illegal or seditious behaviour or behaviour contrary to peace and public order on the part of its employees, so as to preserve peace and ensure the protection of persons and property in the vicinity of the Works against such behaviour.

2.3.6. Observation by subcontractors

The Company shall ensure that its subcontractors comply with the above stipulations.

2.3.7. Labour relations legislation

The Company shall comply with all laws and regulations applicable to labour relations.

2.3.8. Internal information note of the Company

The company should issue an internal information note to raise workers' awareness of the following issues:

- Workers are prohibited from hunting in the area of the works and for the duration of the works. Failure to comply with this rule shall be grounds for immediate dismissal,
- Raising workers' awareness of the importance of environmental protection,
- Raising workers' awareness of respect for the customs and habits of the people in the towns where the work is carried out,
- Sensitisation of workers on the risks of STIs and AIDS,
- Distribution of condoms to Enterprise staff.

2.4. Waste incineration

It is strictly forbidden to burn construction site waste on site.

2.5. Filler materials

2.5.1. Loading and transport of filler materials

During the execution of the work, the Company must :

- take the necessary measures to limit the speed of vehicles on the site by installing traffic signs and flag bearers,
- water traffic routes in populated areas on a regular basis,

2.5.2. Deposits of filler materials

The company must :

- load trucks in such a way as to avoid loss of material during transport,
- ensure that trucks and construction machinery maintain a maximum speed of 40 km/h, especially when crossing neighbourhoods, and 20 km/h on the work site,
- plan an installation according to the importance of the work,
- put in place adequate signage.

III. SANCTIONS AND PENALTIES

3.1. Management of environmental non-conformities on site

Non-conformities detected during inspections carried out by the project owner will be dealt with according to the seriousness of the situation. Non-conformities will thus be divided into 4 categories:

Category 1: Notification of Observation, for minor non-conformities.

This level only involves notification by the Engineer to the Company's Site Representative, with signature of an Observation Notification prepared by the Engineer; multiplication of Observation Notifications at a Site, or failure to take the Observation Notification into account by the Contractor, may raise the Observation Notification to level 1 non-conformities.

Category 2: Level 1 non-conformity: for non-conformities that do not involve a serious and immediate risk to the environment and health; the non-conformity is the subject of a report sent to the Company and must be resolved within five (5) days. The Company will send the Engineer the problem resolution report. After a visit and a favourable opinion, the Engineer will sign the non-conformity closure report. In all cases, any Level 1 non-conformity not corrected within one (1) month will be raised to Level 2.

Category 3: Level 2 non-conformity: applicable to any non-conformity that has resulted in damage to the environment or health or presents a high risk to the environment or health. The same procedure as for level 1 non-conformities is applied

The resolution must be made within three (3) days. The Company shall send its resolution report. Any Level 2 non-compliance not corrected within one (1) month will be elevated to Level 3.

Category 4: Level 3 non-conformity: applicable to any non-conformity presenting risks of major seriousness or having caused environmental or human damage. The highest hierarchical level present in the country of the works, the Company and the Project Owner are informed immediately and the Company has twenty-four (24) hours to secure the situation.

A level 3 non-compliance will result in the suspension of payment of the next statement until the non-compliance is resolved. If the situation so requires, the Owner may order that work be suspended pending resolution of the non-compliance.

3.2. Acceptance of work

In accordance with the contractual provisions of the works, failure to comply with these clauses during the execution of the project exposes the offender to the refusal to sign the provisional or final acceptance report of the works, by the Acceptance Committee, with the withholding of the performance guarantee being blocked.

3.3. Notification

Any infringement of the requirements duly notified to the Company by the inspection must be rectified. The resumption of work or additional work resulting from non-compliance with the clauses shall be borne by the Company.

At the end of the works, the Company will carry out all the work necessary to restore the premises. It will have to fold up all its equipment, machinery and materials. It may not leave any equipment or materials on the site or in the surrounding area.

If it is in the interest of the Project Owner or a local authority to recover the fixed installations for future use, the interested structure may ask the Owner to transfer without compensation the installations subject to demolition during a withdrawal.

After the equipment has been folded up, a report stating that the site has been restored must be drawn up and attached to the work acceptance report.

FRAMEWORK FOR QUOTES FOR ENVIRONMENTAL AND SOCIAL SERVICES

PRICE NO.	DESIGNATION OF SERVICES	UNITE	QUANTITY	PU in FCFA	AMOUNT in FCFA
<u>ITEM 000 - ENVIRONMENTAL AND SOCIAL MEASURES</u>					
000.1	SOIL POLLUTION BY SOLID WASTE <ul style="list-style-type: none"> • Have closed containers for daily collection of solid waste; • Recommend to each worker, manager, driver, etc., the use of the receptacles • Separate solid waste and have it regularly removed to appropriate dumpsites; • Recycle solid waste that can be recycled (empty cement bags, plastic or glass bottles, pieces of glass, etc.), of wood 	Fft	1	Fft	
000.2	AIR POLLUTION BY DUST EMISSION <ul style="list-style-type: none"> • Watering areas likely to cause dust emissions • Limit the load of supply trucks to the level of the crates and cover the trucks according to the regulations in force 	Fft	1	Fft	
000.3	TRAFFIC DISRUPTIONS AND RISK OF ACCENTS <ul style="list-style-type: none"> • Hold weekly road safety meetings • Marking the boundaries of work areas • Put up signs of temporary signage 	Fft	1	Fft	
000.4	RISK OF ACCIDENTS AT WORK AND DAMAGE TO THE HEALTH AND SAFETY OF WORKERS AND EQUIPMENT <ul style="list-style-type: none"> • Conduct regular site meetings on hygiene, health and safety for workers • Provide Personal Protective Equipment (PPE) (harnesses, dust masks, gloves, helmets and work boots, fall arrest harnesses) • Provide a first-aid post for 	Fft	1	Fft	

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VOLUME 2.2 : IDENTIFICATION, EVALUATION OF ENVIRONMENTAL IMPACTS AND RISKS, ELABORATION OF
THE ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (PGES) AND THE RISK MANAGEMENT PLAN (PGR)
FOR THE DEVELOPMENT OF LOWLAND IRRIGATED AREAS.

PRICE NO.	DESIGNATION OF SERVICES	UNITE	QUANTITY	PU in FCFA	AMOUNT in FCFA
	first aid and periodic medical visits and check-ups.				
000.5	AWARENESS OF THE ENVIRONMENT, HEALTH, SAFETY AND RESPECT FOR HABITS AND CUSTOMS <ul style="list-style-type: none"> • Raise workers' awareness of the habits and customs of the localities in the project area. • Raising awareness among workers and the population of the risks of contamination and spread of STI/HIV/AIDS • Raising awareness of road safety among workers and the general public • Raising awareness of workers and the population about protection of the environment 	Fft	1	Fft	

CONCLUSION

As with any development project, the development of irrigated perimeters within the framework of the implementation of the Kara basin agropole project will generate both negative and positive impacts. The environmental analysis of the project has made it possible to determine the negative and positive impacts as well as the environmental risks associated with the project.

IMPACTS ON LOCAL AND MOSTLY REVERSIBLE RESOURCES

The construction work on the mini-dams will have localised negative impacts on the natural environment. It is true that the work will have negative impacts on biophysical resources and human aspects, but these impacts can be corrected and mitigated by appropriate measures. The most important impacts are in the exploitation phase and concern more the human aspects related to the exploitation of intensive irrigated crops.

IMPORTANT MITIGATION MEASURES

Mitigation measures for the negative impacts on natural resources and populations are very important and are part of the protection of the biophysical and human environments in the project area. Most of these measures will have to be included in the Technical and Environmental Specifications of the company that will be in charge of the works.

In order to minimise, reduce and compensate for the negative impacts, both on the biophysical and human environment, an Environmental and Social Management Plan (ESMP) is proposed. A Risk Management Plan is also proposed to prevent or avoid risks related to the project. Measures to mitigate negative impacts on natural resources and populations are very important and are part of the protection of the biophysical and human environments in the project area and will help to minimise these impacts and risks.

COSTS OF ENVIRONMENTAL MEASURES

The costs of measures to mitigate the negative impacts of the works on the environment have been estimated at fifty-six million sixty-seven thousand (56 067 000) F CFA. This amount includes: fifty million nine hundred and seventy thousand (50 970 000) F CFA for the environmental measures and a provision of five million ninety-seven thousand (5 097 000) F CFA for the convention of monitoring and control by ANGE of the implementation of the PGES and the PGR during the construction phase.