MINING AND RESEARCH COMPANY IN MALI (SERM - SA)

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REPORT OF THE ENVIRONMENTAL AND SOCIAL IMPACT STUDY OF THE PROJECT TO EXPLOIT THE SMALL GOLD MINE OF MASSALA IN THE RURAL COMMUNE OF BAYA (CERCLE DE SELINGUE) IN THE REGION OF BOUGOUNI, ON BEHALF OF SERM SA.

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Acronyms and abbreviations

ABFN	Niger River Basin Agency
AEDD	Environment and Sustainable Development Agency
AES	Water supply Summary
AGR	Income-Generating Activity
CAPE	Educational Animation Center
COP	Conference of the Parties
CSCOM	Community Health Centre
CSRef	Reference Health Center
DGCT	General Directorate of Local Authorities
DGEF	Directorate-General for Water and Forests
PWCB	Directorate-General for Civil Protection
DGR	General Directorate of Roads
DGSHP	Directorate-General for Health and Public Hygiene
DNA	National Directorate of Agriculture
DNACPN	National Directorate of Sanitation and Control of Pollution and Nuisances
DNAT	National Directorate of Spatial Planning
DNGM	National Directorate of Geology and Mines
DNH	National Directorate of Hydraulics
DNPC	National Directorate of Cultural Heritage
DNPSES	National Directorate of Social Protection and Solidarity Economy
UHDN	National Directorate of Urban Planning and Housing
DRACPN	Regional Directorate for Sanitation and Pollution and Nuisance Control
DREF	Regional Directorate of Water and Forests
HR Director	Regional Directorate of Hydraulics
DRPC	Regional Directorate of Civil Protection
DRPC	Regional Directorate of Cultural Heritage
DRPSES	Regional Directorate for Social Protection and Solidarity Economy
DRS	Regional Health Directorate
DRUH	Regional Directorate of Urban Planning and Housing
SEA	Strategic environmental assessment
ESIA	Environmental and Social Impact Assessment
PPE	Personal Protective Equipment
ESE	Expert in Environmental Safeguards
ESS	Social Safeguards Expert
FCFA	African Financial Community Franc
HSE	Health, Safety and Environment
IST	Sexually transmitted infection
MEADD	Ministry of the Environment, Sanitation and Sustainable Development
MDRI	Integrated Rural Development Mission
NGO	Non-Governmental Organization
IDDPs	Integrated and Sustainable Development Programme for the Sankarani Basin
ESDC	Economic, Social and Cultural Development Program
ESMPS	Environmental and Social Management Plan
C-ESMP	Environmental and Social Management Plan for the Site
PI	Fire hydrant
POI	Internal Operation Plan
ESPP	Environmental Protection Plan for the Site
RIA	Armed fire hose
FNCPA	Sanitation and Pollution and Nuisance Control Service
SERM	Mining and Research Company in Mali
SHVA	Improved Village Hydraulics
SLPSIAP	Local Department of Planning, Statistics and Information Technology, Spatial Planning and Population
IUCN	International Union for Conservation of Nature
HIV/AIDS	Human Immunodeficiency Virus - Acquired Immunodeficiency Syndrome

Summary

The preparation of this report on the project to exploit the small gold mine of Massala initiated by the Société d'Exploitation et de Recherche Minière au Mali (SERM SA) is part of the Environmental and Social Impact Assessment (ESIA) procedure in force in Mali.

It is a study on the initial state of the site's environment, the identification of the impacts that could occur during the various phases of the project and the determination of appropriate measures to prevent, improve the positive impacts and mitigate and compensate for the impacts deemed significant.

According to Decree No. 2018-0991/P-RM of 31 December 2018, relating to the Environmental and Social Impact Study and Notice, the project is classified in category "B" of projects subject to ESIA because of its less significant impacts on the environment, unlike category "A" projects whose impacts are more significant.

The legislative and regulatory framework applicable to the project includes, among others: Law No. 032 of 24 May 2021 on pollution and nuisances, Law No. 2023-040 of 29 August 2023 on the Mining Code in the Republic of Mali, Law No. 10-028/AN-RM of 12 July 2010 determining the principles of management of resources in the national forest domain, Law No. 02-006/AN-RM of 31 January 2002 on the Water Code, Law No. 08-033/AN-RM of 11 August 2008 on classified installations for the protection of the environment, as well as the various decrees relating to environmental protection and international conventions related to the project's activities.

At the institutional level, the project is of interest primarily to the Ministry of Mines. In terms of environmental aspects, the technical structures: the National Directorate for Sanitation and Control of Pollution and Nuisances (DNACPN), the General Directorate of Water and Forests (DGEF), the Agency for Environment and Sustainable Development (AEDD) and the Niger River Basin Agency (ABFN) of the Ministry of the Environment, Sanitation and Sustainable Development are concerned. In addition to these various structures, ministerial departments such as the Ministry of Territorial Administration and Decentralization, the Ministry of Energy and Water, the Ministry of Security and Civil Protection, the Ministry of Health and Social Development, the Ministry of Handicrafts, Culture, Hotel Industry and Tourism, the Ministry of Urban Planning, Housing, Domains, Spatial Planning and Population are stakeholders in the project.

In addition to the applicable national environmental regulations, the project complies with the provisions of international agreements, conventions and treaties ratified by the State of Mali such as the Convention on Biological Diversity, the United Nations Framework Convention on Climate Change, the Convention concerning the Protection of the World Cultural and Natural Heritage, the International Plant Protection Convention, the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, the Kyoto Protocol to the United Nations Framework Convention on Climate Change, the Vienna Convention for the Protection of the Ozone Layer, the Montreal Protocol on Substances that Deplete the Ozone Layer and its amendment adopted in London on 29/06/1990 and the Paris Agreement on Climate Change, adopted on 12/12/2015 by the 21st session of the Conference of the Parties to the Framework Convention on Climate Change (COP21) and the 11th session of the COP acting as the meeting of the Parties to the Kyoto Protocol, held in Paris from 30/11 to 12/12/2015.

Project description
The project includes three (3) infrastructures:

- the quarry (10 ha);
- the processing plant;
- the living quarters.

The factory and the base camp will be located on an area of 5 hectares. They will be adjoining and separated by a wire fence.

Method of operation

Mining consists of two stages: extraction and processing of the ore.

The extraction of the ore will not require the use of explosives because it is not very consolidated. Its treatment will be done by gravimetry.

In terms of mining equipment, the project includes: 1 Bulldozer, 2 Excavators, 2 Dump Trucks, 2 Loaders and 3 Light Vehicles.

Access tracks

The access roads that will be used are:

- the track linking the quarry to the factory (1 km);
- the track linking the operating permit to Siékorolé (22.6 km).

The tracks already exist and will be rehabilitated as part of the project.

Workshops and shops

It will be located on the site: a mechanical workshop consisting of a hangar and an office, a storage platform for fuel tanks and a shed for the diesel pump, a warehouse for the storage of lubricants, spare parts and tools, a parking lot for mining machinery and trucks, and a hangar for light vehicles.

Administrative and social buildings

It will be located on the site: three offices in 40-foot containers, a meeting room in 20-foot containers, a living camp with 5 40-foot containers, 8 toilets, a kitchen installed in a 40-foot container, a refectory in two 20-foot containers, an infirmary in a 20-foot container, a guardian's lodge, a wire mesh fence.

Water and electricity supply

The water and electricity facilities will consist of: three (3) boreholes equipped to supply the plant, two (2) water boreholes equipped to supply the administrative and social buildings and two (2) 800 kVa and 110 kVa generators and solar installations on the site.

Mud basin

The sludge basin will consist of: a pulp storage tank (length 5 m, width 2 m and depth 3 m), a water settling basin, consisting of two pits (each 80 m long, 10 m wide, 3 m deep), a plant water storage basin (length 80 m, width 10 m, depth 3 m).

The mud pond is located about 2 km from the nearest watercourse. It is installed on the same site as the factory.

Staff

The small mine will employ 54 people, including 3 part-time employees.

Initial state of the project environment

Physical Environment

Flora

The vegetation is as follows: wooded savannah, treed savannah and shrub savannah.

Fauna

The fauna was once rich and varied; But nowadays, it is becoming increasingly rare due to multiple factors: habitat degradation, anthropogenic pressure, etc. The main wildlife species likely to be encountered in the area are hares, green monkeys, squirrels, avian fauna and various species of snakes.

Hydrography

The hydrographic network of the area is essentially made up of two tributaries of the Niger River: the Sankarani and the Wassoulou Ballé.

Relief

The relief of the area is formed by lateritic plateaus, valleys and plains. The average altitude in the area reaches 250 m.

Climate

The climate is that of the pre-Guinean zone with two well-marked seasons, a rainy season of 5 months (May to September) and a dry season of 7 months (October to April).

Climate change trends in the area

The main trends observed by the populations are: a regular decrease in the amount of rain and a spatio-temporary variation, strong solar radiation throughout the year with little differentiation in average temperatures and an early drying up of secondary rivers.

Socio-economic environment

The project is located in the rural commune of Baya (Cercle de Sélingué) in the Bougouni region.

The commune has the following demographic characteristics: a young and slightly female population, ethnic diversity, an agro-sylvo-pastoral vocation, a predominantly Muslim population. The population of the rural commune of Baya is estimated at 31,784 inhabitants.

The main economic activities in the area are: agriculture (cereal crops, vegetable crops, fruit production, cash crops), livestock farming (it is extensive and employs almost the entire working population), fishing (a developed and permanent activity in the area), exploitation of forest resources (the main sources of energy in the area remain firewood and charcoal), trade/handicrafts (the most important weekly fair in the area is the Dalabala market and artisanal gold panning (a widespread activity practiced during the dry season).

The main infrastructures are: rural roads linking villages, health centres (CSRef, CSCOM, maternity wards and dispensaries), hydraulic equipment (AES, boreholes, large-diameter wells and traditional wells), schools (pre-school, public, community, private and madrasas).

Public consultation

A public consultation was organized in Kangaré (capital of the rural commune of Baya), on March 6, 2025. There were 38 participants.

The main concerns and expectations of stakeholders are as follows:

- the rehabilitation of access roads;
- the supply of drinking water to Dalaba and Massala (hamlet);
- the construction of new classrooms;

- the employment of local young people;
- compliance with the closure plan for the small gold mine;
- the preservation of watercourses.

At the end of the public consultation, the populations and local authorities expressed their support for the project.

Project Alternatives

The project, due to its planned mode of exploitation, constitutes an alternative to artisanal gold panning which is spreading destructively in the area. From the analysis of the options chosen, the advantages outweigh the disadvantages that will be manageable with the application of mitigation and compensation measures.

The option without a project will certainly lead to the invasion of the permit by gold miners with all the harmful consequences that this could have on natural resources.

Identification, analysis, assessment of the significance of impacts

The aim here is to have an overview of the impacts of the project on the components of the biophysical and human/socio-economic environments and to define the areas of influence which are:

Direct area of influence

This zone covers a radius of 1000 m around the operating permit.

Indirect zone of influence

It is broader and concerns the surrounding village where socio-economic activities are carried out.

The project is composed of three (3) phases which are:

During the installation phase, the sources of impact are:
- the rehabilitation of access roads;
- the delivery of equipment;
- clearing and cleaning the right-of-way of the activity sites (quarry, factory and base camp);
- excavations and earthworks on the ground;
- the installation of various equipment;
- the construction of infrastructure and buildings;
- the presence of labour.

During the operation phase, the sources of impact are:
- ore extraction;
- the transport of ore from the quarry to the factory;
- the energy source used (generators);
- waste produced on the site;
- waste rock deposits;
- the waters of the mud basin;
- the presence of labour;
- periodic maintenance work on access roads.

During the closure phase, the sources of impact are:
- the dismantling of equipment and various infrastructures;
- site cleaning and waste disposal;
- the levelling of surfaces and the spreading of deposited materials;

- the equipment of water sources (boreholes) for the benefit of the surrounding populations;
- the presence of labour.

In general, the positive impacts of the project will be felt in the human/socio-economic environment. Their importance varies from medium to major.

The negative impacts are mainly perceptible in the biophysical environment, with a low rate of major impacts.

The cumulative positive and negative impacts are generally of moderate importance.

Proposed actions
The main measures proposed in the framework of the project are:

Mitigation measures

Health

- provide dust masks to staff;
- install and maintain toilets regularly;
- to provide pharmacy boxes;
- providing drinking water to staff;
- raise awareness of the risks of the spread of STIs and HIV-AIDS;
- organize quarter-hour sessions on health risks;
- set up an infirmary and provide first aid;
- support the local health center with basic necessities to facilitate the care of patients;
- carry out periodic medical checks of staff;
- install tricolour bins (red, yellow and black) for sorting waste from the infirmary;
- evacuate the safety boxes containing the injection needles to the health centre;
- evacuate biomedical waste to the health centre for treatment;
- maintain sanitation on the site;
- provide mosquito nets to the residents of the base camp;
- build toilets that comply with hygienic standards (respect for the person/toilet ratio);
- require the wearing of dust masks;
- moisten surfaces during levelling and spreading of materials.

Security

- install and respect road signs along the paths and more particularly at the crossings;
- install flag bearers at truck exits;
- limit speed;
- raise awareness among the company's drivers;
- provide PPE to staff;
- comply with the mandatory wearing of PPE;
- post safety instructions on the site;
- prohibit the use of narcotics (alcohol, drugs, etc.);
- respect the internal rules posted on the site;
- organise quarter-hour sessions on the risk of accidents;
- install fire extinguishers;

- develop and implement an Internal Operation Plan (POI) in collaboration with the General Directorate of Civil Protection;
- training staff in first aid, handling, extinguishing, rescue and clearance;
- have emergency resources available in high-risk areas: fire hydrants (PIs), armed fire hoses (HOSEs), etc.

- organize annual simulation exercises with the General Directorate of Civil Protection;
- schedule prevention visits by the Civil Protection;
- prohibit people from entering dangerous areas (e.g. quarries);
- install safety barriers around the holes;
- to park guards around the quarry;
- install signs prohibiting access to the area;
- raise awareness among the surrounding population about the risks of falling;
- install and respect road signs along the paths and more particularly at the crossings;
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- require the headlights to be turned on;
- support the local health centre with essential medicines to facilitate the management of traffic accidents;
- raise awareness among the company's drivers;
- raise awareness of the risks of road traffic accidents;

Ambient air

- moistening the work areas and watering the access roads;
- respect the watering frequency;
- comply with standards for reducing the emission of pollutants into the atmosphere;
- regularly maintain the machines;
- reduce the speed to 20km/h for vehicles in dry periods;
- Ensuring regular maintenance of machinery (e.g. generators) to control $CO_{2\ emissions}$;
- Install a filter device on the machines;
- measure air quality using a measuring device.

Soundscape

- prohibiting noisy work at night;
- regularly maintain motorized machinery;
- make it compulsory for exposed personnel to wear headphones or earplugs;
- soundproofing noisy equipment (e.g., crushers, generators, etc.);
- measure noise pollution with a sound level meter to comply with the required standards.

Vegetation

- strictly use open spaces for activities;
- avoid felling trees as much as possible;
- raise awareness among staff.

Fauna

- limit brush clearing to the perimeter where infrastructure and equipment are installed;
- avoid crushing wildlife by the machines as much as possible;
- reduce noise pollution as much as possible;

- prohibit the hunting of game by personnel.

Ground

- optimize the space dedicated to excavation and earthworks;
- close the holes;
- apply the required protocols for remediation;
- stabilize the surroundings of excavation holes to reduce the risk of water erosion;
- fix the slopes of the waste rock deposits to reduce the risk of landslides;
- install anti-erosion devices (e.g. stone barriers) in vulnerable areas;
- Install watertight platforms for the storage of pollutants (hydrocarbons, engine oils, greases, etc.).

Landscape

Maintain the natural vegetation screens around the site.

Sites of cultural/archaeological interest

- stop work immediately in the event of the discovery of ancient objects;
- inform the Mine Management in the event of the discovery of ancient objects;
- secure the perimeter in which the ancient object was discovered;
- involve the competent service in the event of the discovery of ancient objects;
- work should not resume in the area where the old object was discovered until the competent department has given a favourable opinion.

Rubbish

- install bins for the pre-collection of waste;
- to set up a platform for the deposit and selective sorting of waste;
- incinerate non-hazardous solid waste (paper, cardboard, wood scrap, etc.);
- recruit maintenance workers to ensure the cleanliness of the site;
- store hazardous waste on watertight and fenced platforms;
- collect and dispose of used oil by an approved company;
- recover oil filters, batteries and used tyres;
- install tricolour bins (red, yellow and black) for sorting waste from the infirmary;
- evacuate the safety boxes containing the injection needles to the health centre;
- Dispose of biomedical waste to the health centre.

Waters

- put retention basins around the hydrocarbon tanks;
- set up sandboxes next to the diesel pump;
- refuelling the machines using a distribution pump;
- set up a waste collection and disposal system;
- to set up a platform for the storage of engine oils;
- respect the regulatory distance (500m) between the facilities and the watercourses;
- set up a water quality monitoring programme;
- put waterproofing in the mud basin;
- carry out physico-chemical and bacteriological analyses;
- set up a groundwater quality monitoring programme (wells) at the village level;
- build septic tanks at the level of the living quarters for the treatment of domestic wastewater;
- regularly check the settling device at the level of the sludge basin.

Employment

- to promote the recruitment of nationals from the surrounding village;
- apply the law in terms of worker recruitment.

Compensation measures

Proceed with compensatory reforestation.

Enhancement measures

- reprofile access roads and construct crossings as needed;
- supporting the health centre with essential medicines;
- equip the boreholes carried out on the sites for the benefit of the surrounding populations when the mine closes.

Emergency Management Plan

Emergencies related to on-site activities focus on the risk of fires, traffic accidents and oil spills. For the management of emergency situations, provisions for the prevention and correction of accidents are proposed. There are general measures and specific measures.

Environmental and Social Management Plan (ESMP)

The Environmental and Social Management Plan (ESMP) is the document for the implementation and monitoring of the measures envisaged by the ESIA to eliminate, reduce and possibly compensate for the harmful consequences of the project on the various components of the environment. Its implementation involves the following entities:

For internal follow-up

- the Mine Directorate, responsible for the overall implementation of the ESMP;
- the HSE Officer, responsible for the execution of the ESMP measures and the preparation of reports;
- the Environmental Safeguards Expert (ESA), responsible for supervising environmental activities;
- the Social Safeguards Expert (SSE), responsible for supervising social activities.

For external monitoring

It is carried out by the interministerial technical monitoring committee under the leadership of the National Directorate for Sanitation and Control of Pollution and Nuisances (DNACPN). This committee is responsible for monitoring the implementation of the measures contained in the ESMP through on-site monitoring.

The environmental components monitored by the project are: vegetation, wildlife, water, soil, ambient air, noise environment, health, safety and local employment.

The follow-up program is based on the following elements:

- the control of the proper functioning of the installations;
- the quality control of atmospheric emissions;
- regular monitoring of the effective emptying of machinery and liaison vehicles;
- periodic monitoring of water quality;
- monitoring compliance with health measures;
- monitoring compliance with safety measures;

- monitoring of soil restoration work;
- verification of the proper functioning of the emergency management plan,
- verification of compliance with security procedures,
- monitoring the recruitment of local employees.

The proposed training and awareness-raising themes are:

- fire safety training;
- training and awareness-raising in environmental management;
- raising awareness of the wearing of Personal Protective Equipment;
- training in clean-up protocols, etc.

The implementation matrix table for the proposed measures presents the responsibilities as well as the monitoring indicators to ensure that their effectiveness is monitored (see Table 29).

The cost estimates of the main environmental and social measures are summarized in the table below.

Designation	Amount (FCFA)
Compensatory reforestation	51 631 250
Land clearing tax	225 000
Anti-erosion device	12 500 000
Waste Rock Deposit Stabilization	7 500 000
STI and HIV/AIDS awareness	1 000 000
Road safety awareness	1 000 000
Training, capacity building for local actors	2 500 000
Total	**76 356 250**

In conclusion, the commitment of SERM SA in the management of Health, Safety and Environment aspects will be materialized by the establishment of an Environment department which will be responsible for the implementation and monitoring of the provisions recommended in the ESMP. On the basis of this plan and the various commitments of the company, the project to exploit the small gold mine of Massala is to be authorized.

I. Introduction

1. Background and rationale for the project:

SERM SA is the holder of the mining title PR 18/952 Sankarani Research Permit, by Order No. 2018-3516/MMP-SG of October 05, 2018, issued for gold and mineral substances of group 2.
The work carried out by the company in the Sankarani exploration permit has yielded encouraging results to be able to undertake the exploitation of a small gold mine. In fact, two ore bodies have been distinguished and the resources evaluated are exploitable on a small scale.

The small Massala gold mine has reserves estimated at 845kg of gold contained in 970,000t of ore at an average grade of 0.87 g/t and a 75% gravity recovery, without the use of chemicals.

2. Background to the Environmental and Social Impact Assessment (ESIA)

The carrying out of the Environmental and Social Impact Assessment is mandatory in the Republic of Mali for all activities likely to cause disturbances or modifications to the biophysical and human/socio-economic environment by Decree No. 2018-0991/P-RM of 31 December 2018, relating to the Environmental and Social Impact Study and Notice.
The Massala small-scale gold mine project is classified as a "B" gold mine. It is listed at no. 49 on the list of projects submitted to the ESIA.

3. Objectives of the ESIA

3.1. Main objective:

The main objective of the study is to provide stakeholders with the information necessary to make decisions on the environmental and social feasibility of the project.

3.2. Specific objectives:

The specific objectives of the ESIA are:

- identify the issues and concerns related to the operation of the small gold mine;
- prevent environmental degradation on the site and in its surroundings;
- assess the impacts of the project on the biophysical and human/socio-economic environments;
- to preserve any cultural sites and ancient objects likely to be found on the perimeter of exploitation;
- to inventory forest resources (flora and fauna);
- propose measures to mitigate and/or compensate for negative impacts;
- to propose support measures for the benefit of the populations in the context of community development;
- to provide security measures on the site and in its surroundings;
- to carry out community mobilization and the organization of public consultation;
- to develop and budget an Environmental and Social Management Plan (ESMP);
- to involve all stakeholders in the public consultation process (administrative and municipal authorities concerned, technical services, surrounding populations, civil society organisations, etc.);
- to draw up a plan for the closure and rehabilitation of the small mine;
- Develop a community development plan.

NB: There will be no expatriate staff mobilized.

4. Methodology adopted

The general approach adopted for the conduct of the study was to:

- collect documentation from the company SERM SA and the rural municipality of Baya; review the key components of the project in order to understand its issues from an environmental point of view;
- make contact with the administrative and communal authorities, the village chieftaincy and the population;
- carry out investigations on the selected operating perimeter, including the locations of the quarry, the factory and the remote site;
- to carry out focus groups in Dalaba;
- carry out an inventory of plant and animal species on the site;
- delineate the project's areas of influence (direct and indirect);
- Hold a public consultation session
- Analyze the data collected.

4.1. Data collection

The following documents were collected: the feasibility report of the project, the Economic, Social and Cultural Development Program (PDESC) of the rural commune of Baya.
Other information on economic activities was collected in the field.

4.2. Review of project components

The project components included in the feasibility study were reviewed to identify the location of the future infrastructure on the site and to define the nature of the environmental issues.

4.3. Contacting local stakeholders

The consultant paid a courtesy visit to all local stakeholders in order to explain the objectives of the environmental study and to gather their opinions on the project from the beginning of the research work to the present.
The meetings with local actors were held from January 17 to February 4, 2025.

4.4. Field investigations

Field trips were conducted to reconnoitre the site and establish the basic environmental conditions of the site. The investigations also made it possible to understand the village terroir, to list the access roads and to understand the local hydrographic network.

4.5. Organization of focus groups

Also with a view to better understanding the concerns and opinions of the surrounding populations, meetings with different strata of society (the village chieftaincy, women and youth) were organized in Dalaba.

4.6. Inventory of forest resources (flora and fauna)

In collaboration with the local Water and Forests department, an inventory of resources (flora and fauna) was carried out in order to identify all the plant and fauna species found on the site.

4.7. Delineation of the project's areas of influence

The Consultant examined the foreseeable areas of influence of the project, both from a socio-economic and a physical and biological point of view, using topographical and geological maps. Thus, two zones of influence have been defined (direct and indirect).

4.8. Public consultation organization

In collaboration with the local authorities and the Sanitation and Pollution and Nuisance Control Service, the consultant organized a public consultation in the capital of the rural municipality of Baya.

4.9. Analysis of the data collected

The data collected throughout the process was analysed in detail in order to:

- assess the potential impacts of the project on the environment;
- propose mitigation, compensation and enhancement measures;
- estimate the cost of the measures and integrate them into the environmental and social management plan;
- develop a monitoring and follow-up plan for the defined actions

II. Project description and its components

1. Presentation of the promoter:

The promoter of the project is the Société d'Exploitation et de Recherche Minière au Mali (SERM.SA) under Malian law with its registered office in Bamako. It was created on March 15, 2018.

2. Presentation and location of the study area:

The project is located in the Sankarani exploration permit, located in the south of Mali in the Yanfolila Geological District. The operating permit subject to this study is located in the rural commune of Baya (Sélingué circle) in the Bougouni region. It is accessible by the asphalt road of Bamako-Bougouni-Yanfolila (240 km), the lateritic road Yanfolila-Siékorolé (40 km) and the communal track of Siékorolé to the site (22.6 km).

The closest village to the site is Dalaba. It is located about 9 km from the quarry site.

NB: At the end of the construction work of the Sélingué hydroelectric dam in the 1980s, the village of Dalaba was flooded by the waters of the lake. Faced with this situation, part of the village has been relocated to the right bank of the lake in Kangaré (capital of the commune), but the old village, although small in terms of area, has remained on the left bank where the permit is located (see location map).

3. Operating Permit:

The operating permit corresponds to the useful space in terms of mineralization and covers an area of 3 km². Its contact details are as follows:

Point A: Intersection of the parallel 11° 29' 17.94"N with the meridian 8°11'2.26" W
From point A to point B following the parallel 11° 29' 17.94"N
Point B: Intersection of the parallel 11° 29' ,17.94"N with the meridian 8° 10' 33.15"W
From point B to point C following the meridian 8° 10' 33.15"W
Point C: Intersection of the parallel 11° 27' 34.9" N with the meridian 8° 10' 33.15"W
From point C to point D following the parallel 11° 27' 34.9" N
Point D: Intersection of the parallel 11° 27' 34.9" N with the meridian 8°11'2.26" W
From point D to point A following the meridian 8°11'2.26" W

NB: No facilities are located within the operating permit (e.g., field, livestock yard, etc.).

4. Project infrastructure:

The project includes three (3) infrastructures summarized in the table below.

Table 1. Project infrastructure

Infrastructure	Summary Description
Career	As the ore is shallow, open-pit mining is the method chosen. The quarry has an area of 10 ha.
Ore Processing Plant	They will be installed on a total area of 5 ha. The two infrastructures will be adjoining and separated by a wire fence. The living quarters include administrative and social buildings.
Remote site	

Source: Project Feasibility Report

The coordinates of the infrastructures are given in the table below.

Table 2. Infrastructure contact information

ID	X	Y	Infrastructure
Has	589174	1268460	Career
B	589410	1268462	
C	589412	1268162	
D	589176	1268160	
Has	588930	1268970	Factory and remote site
B	589157	1268970	
C	589157	1268747	
D	588930	1268747	

Source: Exploration work

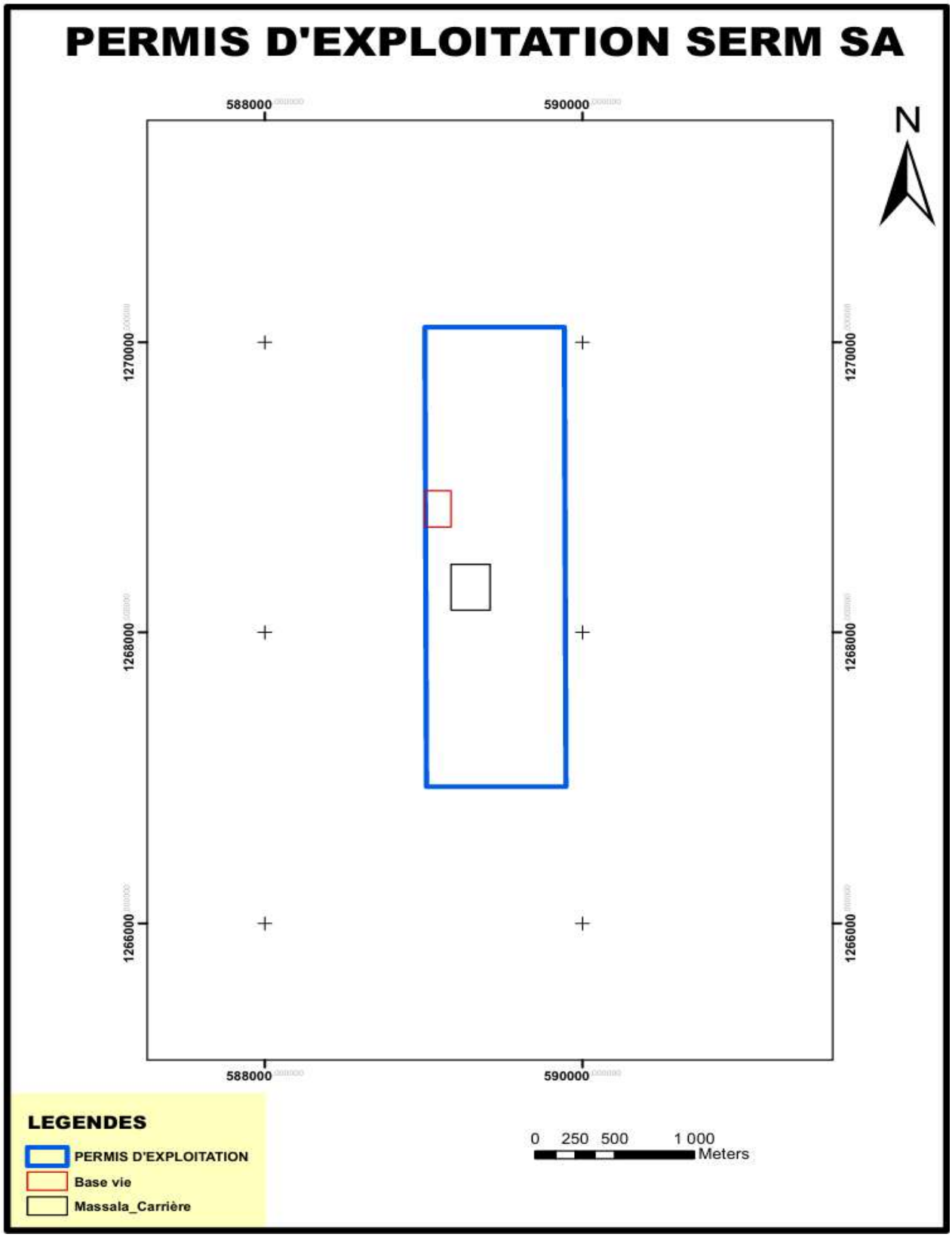


Figure 1. Ground plan of the operating permit

5. Project description

The small mine will produce about 100kg of gold per year in an ore processing plant with a maximum capacity of 50t/h. It will have a lifespan of at least 5 years.

5.1. Method of operation

Mining consists of two stages: extraction and processing of the ore.

5.1.1. Ore extraction

Ore extraction activities will begin with the clearing of trees and the stripping of waste rock by a bulldozer equipped with a sliding device. The excavated waste rock will be stored next to the area, in an appropriate location, pending its probable use in the rehabilitation phase of the site. As the ore is not very consolidated, it will be excavated by two excavators (the use of explosives will not be necessary).

After excavation, the ore will be transported by two dump trucks filled by a front-end loader and stored on the processing plant's feed platform (Figure 4).

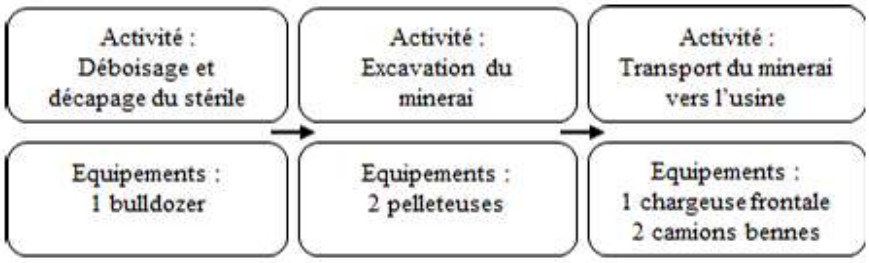


Figure 2. Diagram of ore extraction

5.1.2. Ore Processing

The treatment plant will be located about 1 km from the quarry. The access road from the quarry to the mill will be developed and maintained in good condition throughout the operation.

The treatment method chosen is ***gravimetric separation***. Given the composition of the ore, the project provides for a processing plant consisting of a sieve line and two crushers (for hard rock), a trommel line and accessories (for alluvial ore) and a line of two concentrators, a vibrating table and a smelter.

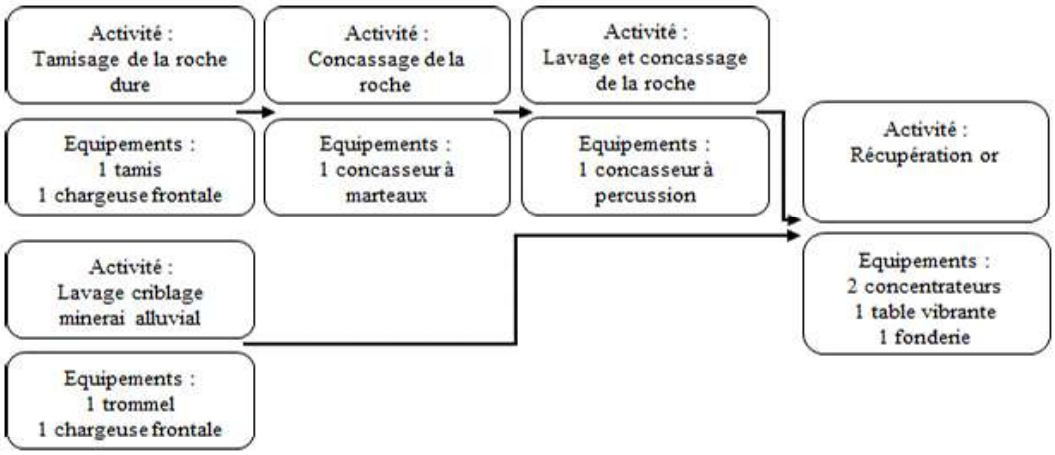
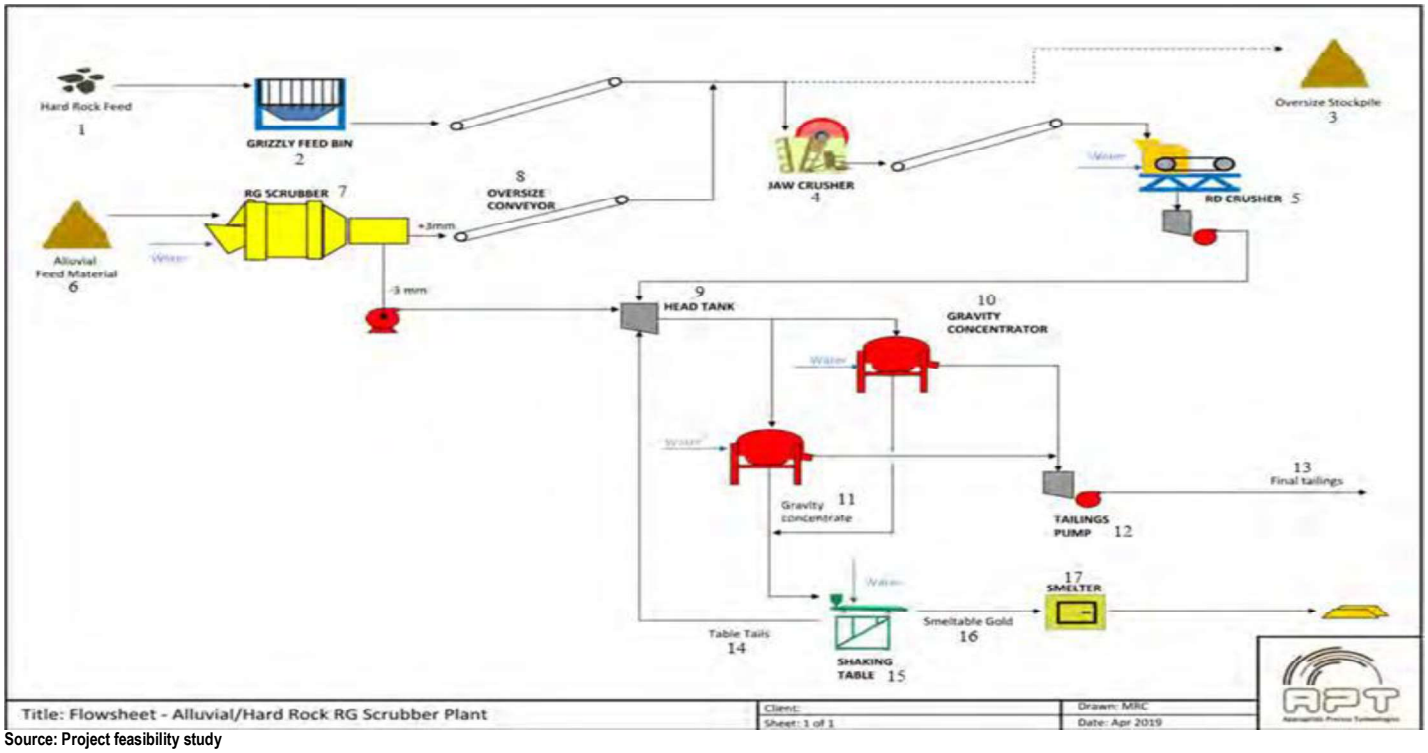


Figure 3. Flowsheet of ore processing



Source: Project feasibility study

Figure 4. Schematic of the plant

Légende :	
1 : Alimentation en roche dure	10 : Concentrateur gravimétrique
2 : Tamis équipé de trémie	11 : Concentrateur gravimétrique
3 : Rejets du Tamis	12 : Pompe des rejets des concentrateurs
4 : Concasseur à mâchoires	13 : Vers le bassin à boue
5 : Concasseur à percussion	14 : Rejet de la table vibrante
6 : Alimentation en minerai alluvionnaire	15 : Table vibrante
7 : Trommel de lavage	16 : Concentré pour la fonte
8 : Convoyeur	17 : Fonderie
9 : Réservoir de stockage	

5.2. Planned equipment

The planned mining equipment is shown in the table below.

Table 3. List of mining equipment

Description	Model	Quantity
Bulldozer with sliding device	SHANTUI SD32W	1
Excavator (Bucket 1.5 m^3)	LOVOL FR330D	2
Dump trucks (20 t)	HOWO 371HP	2
Front End Loader (Bucket 3.5 m^3)	LOVOL FL955F-II	2
Light Vehicles	4 x 4 off-road	3

Source: Project feasibility study

5.3. Infrastructure

5.3.1. Access tracks

Access roads will be developed and maintained periodically. These are:

- the track linking the quarry to the factory (1 km);
- the track linking the operating permit to Siékorolé (22.6 km).

NB: The development work will consist of reprofiling the road and rehabilitating the existing structures.

5.3.2. Workshops and shops

It is planned to set up on the factory site:

- a mechanical workshop consisting of a shed and an office;
- a fuel tank storage platform and a shed for the diesel pump;
- a warehouse for the storage of lubricants, spare parts and tools;
- a parking lot for mining machinery (bulldozer, excavators, front-end loaders) and trucks;
- a hangar for light 4x4 vehicles.

5.3.3. Administrative and social buildings

It is planned to set up on the factory site:

- three 40-foot container offices (for the Chief Engineer, the three Quarry, Factory and Garage Supervisors, and the Factory Line Operators);
- a 20-foot container meeting room;
- a 5-piece 40-foot container camp (for resident staff and visitors);
- eight (8) breeze block brick toilets;
- a kitchen installed in a 40-foot container;

- a refectory in two 20-foot containers;
- an infirmary in a 20-foot container;
- a caretaker's lodge made of breeze blocks;
- a wire mesh fence.

5.3.4. Water and electricity supply

The water and electricity installations will consist of:

- three (3) water boreholes equipped with submersible pumps to fill the water storage basin and supply the plant;
- two (2) water boreholes equipped with a submersible pump connected to a water supply network and a human-powered pump to supply the administrative and social buildings;
- two (2) 800 kVa and 110 kVa generators and solar installations on site.

5.3.5. Mud basin

The mud basin will be composed of:

- a pulp storage tank (length 5 m, width 2 m and depth 3 m), equipped with a submersible pump to drain buoy water from the plant to the settling basin;
- a water settling basin, consisting of two pits (each 80 m long, 10 m wide, 3 m deep) parallel and connected to allow the flow of clear water, after settling of the solid particles, from the first pit to the second pit and from the second pit to the plant's water storage basin;
- a lined walled plant water storage basin (length 80 m, width 10 m, depth 3 m), equipped with a submersible pump to supply water to the plant.

The mud pond is located about 2 km from the nearest watercourse. It is installed on the same site as the factory.

5.4. Staff

The small mine will employ 54 people, 3 of whom will be part-time. The composition of the staff is shown in the table below.

Table 4. Staff List

Designation	Number
Permanent staff	
Managing director	1
Accounting secretary	1
Chief Engineer	1
Career Supervisor	1
Environmental Supervisor	1
Bulldozer Operators	2
Backhoe operators	4
Front End Loader Operators (1)	2
Dump truck drivers	4
Quarry workers	2
Plant Supervisor	1
Front End Loader Operators (2)	2
Control Room Operators	2
Screen and crusher operators	2
Trommel operators and accessories	2
Operators of concentrators, shaking table and foundry	2
Factory workers	6
Garage Supervisor	1
Light Vehicle Drivers	3
Storekeeper	1
Multi-Skilled Mechanics	2
Nurses	2
Cooks	2
Guards	4

Designation	Number
Permanent staff	
Housekeepers	3
Part-time staff	
Accountant	1
Expert in environmental safeguards	1
Social Safeguards Expert	1
Total	**54**

Source: Project feasibility study

III. Policy, legislative and institutional framework

1. Policy framework:

1.1. Constitution of Mali:

The Constitution promulgated on July 22, 2023 by Decree No. 2023-0401/PT-RM stipulates in its article 22: Everyone has the right to a healthy and sustainable environment, and article 25: The protection of the environment and the promotion of the quality of life are a duty of every citizen and of the State.

1.2. Strategic Framework for the Refoundation of the State (CSRE 2022-2031)

Faced with the existential threats of the State, the high authorities of the Transition have embarked on a work of rebuilding the State with a view to establishing virtuous governance, building legitimate institutions and rebuilding the Malian man of a new type embodying societal and republican values. In this perspective, the National Refoundation Conference (ANR) was held from December 11 to 30, 2021 throughout the national territory and in countries with a high concentration of Malians living abroad. At the end of the intense and fruitful debates, 517 recommendations were made by the participants which will have to be the subject of a timetable for implementation by the Government to include, among other things, tasks of an enforceable and urgent nature whose execution would be the responsibility of the Transition as well as a monitoring and evaluation mechanism. It is in this context that the Strategic Framework for the Refoundation of the State (CSRE) was developed, the implementation of which will be spread over ten (10) years (2022-2031).

The general objective of the Strategic Framework for the Refoundation of the State is to ensure a genuine process of rebuilding Mali through the implementation of the recommendations of the National Refoundation Conference.
The QEHC is based on the following strategic axes:

- Strategic Axis 1: Governance, Political and Institutional Reforms;
- Strategic Axis 2: Defence, Security, Peace, Reconciliation and Social Cohesion;
- strategic axis n°3: Economic growth and sustainable development;
- Strategic Axis 4: Human Capital, Gender and Social Inclusion;
- strategic axis n°5: Youth, Sport, Culture, Handicrafts, Tourism and Citizen Construction.

In addition to the QEAC, other policies are to be considered in this study. These are :

- the National Environmental Protection Policy;
- the National Sanitation Policy;
- the National Policy on Climate Change;
- the National Forest Policy;
- the National Water Policy;
- the National Health Policy;
- the National Social Protection Policy;
- the National State and Land Policy;
- the National Policy on Spatial Planning;
- the National Cultural Heritage Policy;

✓ **The National Environmental Protection Policy (NPPE)**

Adopted in 2019, it aims to:

- contribute to the promotion of sustainable development and ensure that the environmental dimension is taken into account in all decisions affecting the design, planning, implementation and monitoring and evaluation of development policies, programmes and activities;
- to manage natural resources in a rational manner with a view to promoting sustainable development;
- ensuring food security and the supply of commodities through the sustainable management of renewable natural resources;
- preserve and improve the living environment of all citizens, in particular by fighting against all forms of pollution or nuisance;

- develop national technical and financial capacities to intervene at the different geographical levels;
- promote job creation and the participation of all components of Malian society, especially women and youth, in environmental protection;
- develop sub-regional and international cooperation in environmental protection. The implementation of the PNPE is done through nine (09) programs (which take into account all the international treaties and conventions ratified by Mali).

✓ **The National Sanitation Policy (NAP)**

This policy is part of the long term. Adopted in 2009, its implementation and monitoring and evaluation should be in harmony with the CREDD (2019-2023) and the SDGs. As the CREDD is obsolete, the NAP has been reread (its adoption has not yet been carried out), the new one will be adapted to the SDGs and the Strategic Framework for the Refoundation of the State (CSRE 2022-2031). Its overall objective is to ensure sustainable access to sanitation services for all by ensuring the protection of the environment, respect for equity and respect for gender. It will be structured around the following areas of orientation:

- governance of the sub-sector;
- promoting basic sanitation;
- sustainable solid waste management;
- sustainable management of wastewater and excreta;
- sustainable stormwater management;
- sustainable management of special waste.

✓ **The National Water Policy (NWP)**

It was adopted by the Malian government in 2006. Its overall objective is to "contribute to poverty alleviation and sustainable development by providing appropriate solutions to water-related problems, so that water does not become a limiting factor in socio-economic development" (Ministry of Mines, Energy and Water, 2006). It provides strategic guidelines that must serve as a reference framework for the sustainable management of the country's water resources, while respecting the balance of the physical environment and aquatic ecosystems. The National Water Policy (NWP) is based on the following principles:

- the principle of equity;
- the principle of subsidiarity;
- the principle of harmonious development of the regions;
- the principle of management by river basin or aquifer system;
- the Principle of Sustainable Use of Water Resources;
- the principle of protection of users and nature;
- the Levy-Pay Principle;
- the Principle of Participation.

✓ **National Forest Policy (NFP)**

The National Forest Policy is part of the main orientations of the decentralization policy.

Its fundamental objective is the sustainable management of forest, wildlife and fisheries resources. More specifically, it contributes to the implementation of the orientations of the Master Plan of the Rural Development Sector and the priority themes of its Action Plan with regard to the management of forest, wildlife and fisheries resources.

The National Forest Policy is based on three fundamental options, namely: a social option, an economic option and an ecological option.

The social option of the National Forest Policy aims to make rural people responsible for the sustainable management of forest, wildlife and fish resources.

The economic option of the National Forest Policy aims to promote and guarantee investment in land on the one hand and investment in the forestry, wildlife and fisheries sectors on the other.

On the ecological level, the National Forest Policy aims on the one hand to preserve biological diversity in its components, genetic diversity, diversity of products and diversity of landscapes and on the other hand to restore ecosystems as part of the fight against desertification and the advance of the desert.

✓ **The National Climate Change Policy**

To face the challenges of climate change, various actions have been initiated by the various actors in several sectors. The integration of these efforts into a global dynamic in the fight against climate change, with a precise roadmap where priorities are defined, synergies and complementarities identified, has proved necessary. This justifies the development of the National Policy on Climate Change, which serves as a reference framework for the various interventions in the fields of climate change in Mali.

The vision of Mali's National Policy on Climate Change is to define by 2025 a sustainable socio-economic development framework that integrates the challenges of climate change in all sectors of its development in order to improve the well-being of the population. It is developed by focusing on the five operational pillars defined in Bali (Indonesia) at COP 13 in 2007: shared vision, adaptation, mitigation, technology transfer, and financing, while associating in an integrated manner all the programs and all the actors of national life.

Seven guiding principles guide the implementation of the PNCC. These are:

- the precautionary principle and anticipation;
- the principle of equity and common but differentiated responsibility;
- the polluter-pays principle (Article 3 of the UNCAC);
- the principle of decentralization;
- the principle of involvement/accountability;
- the principle of transversal coherence;
- public-private partnership.

The objective of the PNCC is to contribute to the fight against poverty and participate in sustainable development by providing appropriate solutions to the challenges of climate change so that they do not become limiting factors in socio-economic development.

✓ **The National Policy on Spatial Planning (PNAT)**

A National Spatial Planning Policy (PNAT) was adopted by Decree No. 2016-0881/P-RM of 23 November 2016. This policy is intended to contribute to the achievement of the vision adopted by the National Prospective Study-Mali 2025: "To combine wisdom, authenticity and dynamism to make Mali a prosperous, efficient and modern nation whose people will have been able to resolutely seize their own future to remain a people united in its diversity, turned towards a common goal and having an unwavering law for its future".

✓ **The National Policy on Internal Security and Emergency Protection (PNSIPC)**

It is above all a strategic vision, a doctrine based on a certain number of considerations (political, economic, social, cultural, threats, vulnerabilities, alliances, etc.) enabling the State to fulfil its sovereign obligations to protect people, property and institutions while respecting its international commitments in terms of alliance, integration, respect for human and peoples' rights. The general objective of the national policy of internal security and civil protection is to ensure the security of the State, persons and property, as well as the promotion of social peace.

✓ **The National Decentralization Policy (2015-2025)**

Mali's Decentralization Policy has been built around the following guiding principles:

- respect for national unity and territorial integrity;
- respect for the free administration of local authorities;
- respect for local specificities in territorial reorganization;
- the democratic and transparent management of local authorities;
- subsidiarity;
- the progression and concomitance in the transfer of skills and resources;
- the project management of regional and local development by local authorities.

✓ **The National Health Policy**

Mali's National Health Policy synthesizes efforts to:

- promote health insurance and social protection mechanisms (Compulsory Health Insurance – AMO, Medical Assistance Scheme – RAMED), as well as the role of mutual insurance companies in the financing of health;

- improve access to care and reduce the burden of health spending on households.

It is based on the fundamental principles of equity, justice, solidarity, participation of the population and civil society, and it is built on a pyramidal health structure, the first level of which is the Community Health Center (CSCOM), the second level is the Reference Health Center (CSREF), the third and fourth levels are the regional and national hospitals, respectively.

✓ **The National Social Protection Policy**

The National Social Protection Policy aims by 2040 to reduce economic, social and institutional inequalities and injustices in order to build a just social citizenship.
The general objective of the national social protection policy is to gradually build a system of protection against social risks for all citizens in general and disadvantaged groups in particular.
The social protection policy covers:

- the extension of the personal scope (extension to all categories of the population);
- Extension of the material scope (expansion of the areas of service);
- the development of aid and social action;
- the development of mutual insurance and other solidarity-based organizations.

It attaches great importance to certain categories in difficult situations, including the elderly, people with disabilities, children and women, wards, the unemployed and victims of HIV-AIDS.

The material scope of the social protection policy concerns schemes related to sickness, maternity, old age, invalidity, death, accidents at work, occupational diseases, family expenses, unemployment, assistance for access to education, justice, housing and employment.

✓ **The National State and Land Policy**

The national domain of Mali**:** includes the airspace, the ground and the subsoil of the national territory and includes:

- the public and private domains of the State of Mali;
- the public and private domains of local authorities;
- the land assets of other natural or legal persons.

For the State domain, it includes:

- the public domain composed of all buildings and movable property determined as such by law or having been classified;
- the private domain composed of all: - registered buildings and real estate rights held by the State;
- unregistered immovable property over which customary land rights are exercised or not;
- movable property held by the State. Art.

As for the field of local authorities, it includes:

- the public domain composed of all buildings and movable property determined as such by law or having been classified;
- the private domain composed of all movable property, registered buildings and real estate rights held by the local authorities.

The land assets of other natural or legal persons include: all the immovable property that they own by virtue of a land title transferred in their name following the conversion of a right of concession into a registered title deed.

✓ **Mali's Cultural Policy**

The framework document of Mali's Cultural Policy, developed by the Ministry of Culture, presents a comprehensive strategy for the protection and promotion of the country's cultural diversity.

Mali's cultural policy is guided and based on the following principles, defined in international conventions to which Mali is a party.

- respect for human rights and fundamental freedoms.
- equal dignity and respect for all cultures. "The protection and promotion of the diversity of cultural expressions implies the recognition of the equal dignity and respect of all cultures, including those of persons belonging to minorities and those of indigenous peoples." (Convention on Diversity, 2005).
- the specificity of cultural goods and services.
- Sovereignty: in application of the same Convention, which itself refers to the Charter of the United Nations and the principles of international law, Mali affirms and claims its sovereign right to adopt any measure and policy it deems useful to protect and promote the diversity of cultural expressions on its territory.
- sustainability of development: Mali considers cultural diversity to be an essential dimension of development.
- Equitable access: As the 2005 Convention emphasizes: "Equitable access to a rich and diverse range of cultural expressions from around the world and access of cultures to the means of expression and dissemination are important elements in enhancing cultural diversity and encouraging mutual understanding."
- Openness and balance: ensuring that openness to other cultures of the world is appropriately promoted and that these measures are consistent with the objectives pursued by the 2005 Convention.
- Culture as a dynamic force: the protection of a country's cultural expressions cannot result in closing itself off from the world and in the exclusive promotion of heritage to the detriment of the creativity of contemporary expressions.
- International solidarity and cooperation: This principle applies to relations between all countries, because the solidarity they demonstrate will determine regional integration and the rebalancing of forces on a global scale.

2. Legislative framework:

The national legal framework for the environment is made up of several texts. Mali has legislated almost all environmental aspects: fauna, flora, living environment, environmental assessment, biosecurity, water, pesticides, etc. The following is a presentation of the texts considered relevant to this project.

- Ordinance 98-027/P-RM of 25 August 1998 on the creation of the National Directorate of Sanitation, Pollution Control and Nuisances;
- Ordinance No. 2025-017/PT-RM of 1 April 2025 amending Law No. 10-028 of 12 July 2010 determining the principles of management of resources in the national forest domain;
- Ordinance No. 2025-018/PT-RM of April 1, 2025 amending Law No. 032 of May 24, 2021 on pollution and nuisances;
- Law No. 2023-040 of August 29, 2023 on the Mining Code in the Republic of Mali;
- Law No. 032 of 24 May 2021 on pollution and nuisances;
- Law No. 10-028/AN-RM of 12 July 2010 determining the principles of management of resources in the national forest domain;
- Law No. 2018-036 of 27 June Determining the Principles of Wildlife Management and its Habitat;
- Law No. 2022-034 of 28 July 2022, on the protection and promotion of cultural heritage;
- Law No. 02-006/AN-RM of 31 January 2002 on the Water Code;
- Law No. 08-033/AN-RM of 11 August 2008 on classified installations for the protection of the environment;
- Law No. 2017-05/AN-RM of 2 October 2017 on the Code of Local Authorities;
- Law No. 2021-056 of October 07, 2021 amending and ratifying Ordinance No. 2020-014/PT-RM of December 24, 2020 on the State and Land Law;
- Law No. 2017-001/ of 11 April 2017 on agricultural land;
- Law No. 06-045/ of 5 September 2006 on the Agricultural Framework Law;
- Law No. 2017-019/AN-RM of 12 June 2019 on the Framework Law for Spatial Planning;
- Law No. 02-049 of 22 July 2002 amended by Law No. 2018-049 of 11 July 2018 (consolidated version on 20 April 2019);
- Decree No. 2025-0028/PT-RM of 24 January 2025, fixing the transfer prices and fees for public land for commercial, industrial, artisanal, educational, office and residential use.
- Decree No. 10-387/P-RM of 26 July 2010 establishing the list of protected forest species and forest species of economic value;
- Decree No. 99-320/P-RM of 4 October 1999, laying down the procedures for land clearing in the State's forest domain;
- Decree No. 01-394/P-RM of 6 September 2001 laying down the procedures for the management of solid waste;
- Decree No. 01-395/P-RM of 6 September 2001 laying down the terms and conditions for the management of wastewater and slush;
- Decree No. 01-396/P-RM of 6 September 2001 laying down the procedures for the management of noise pollutants;
- Decree No. 01-397/P-RM of 6 September 2001 laying down the procedures for the management of air pollutants;
- Decree 0474/P-RM of 23 June 2014 setting the fee for the public wastewater treatment service.
- Decree No. 07-135/P-RM of 16 March 2007 establishing the list of hazardous waste;
- Decree No. 2015-0889/P-RM of 31 December 2015 determining the Mali Relief Organization Plan (ORSEC PLAN);
- Decree No. 2016-0346/P-RM of 19 May 2016 approving the national strategy document on disaster risk reduction in Mali;

- Order No. 4243/MSPC-SG of 24 November 2016 approving the national risk analysis and coverage scheme in Mali;
- Interministerial Order No. 09-0767/MEA-MEIC-MEME-SG of 6 April 2009 making the application of Malian standards for wastewater discharges, etc.

3. ESIA-specific legislation:

Decree No. 2018-0991/P-RM of 31 December 2018 on the Environmental and Social Impact Study and Notice brings a significant step forward and constitutes an important legislative instrument for environmental protection applicable to the various sectors of activity affecting the environment: natural resources and urban environment, industrial and artisanal activities, mining and agricultural activities, electric transport, etc. The decree insists on the obligation to carry out the ESIA and compliance with the procedure for all projects, whether public or private, the implementation of which is likely to harm the biophysical and human environment. In addition, the implementing provisions of the legislation on environmental and social impact assessments are based on the following principles:

- the environmental assessment is an integral part of the projects and programmes and the results of the impact study are presented in the approval file for obtaining the administrative authorisation;
- the sponsor is responsible for carrying out the study, compiling the ESIA file and ensuring the costs;
- The Proponent shall also ensure that measures to correct, reduce and/or compensate for the negative impacts of the Project are carried out, as well as monitoring/internal control in accordance with the required standards.

The decree specifies the important elements concerning the scope of impact studies, the obligation of the procedure for certain types of projects, the content of the reports, the obligation of public consultation, the development of the Environmental and Social Management Plan (ESMP), including the costs of mitigation measures, the role of the actors and the implementation schedules. For all projects subject to the ESIA, the execution of the works is subject to obtaining an environmental permit decision issued by the Minister for the Environment. The decree, through two decrees, has provided major clarifications. These are:

- Interministerial Order No. 10-1509/MEA-MIIC-MEF of 31 May 2010 setting the amount, payment and management terms of expenses relating to activities relating to the environmental and social impact study;
- Interministerial Order No. 2013-0256/MEA-MATDAT-SG of 29 January 2013 setting out the terms and conditions for public consultation on ESIAs.

4. International agreements, conventions and treaties:

To illustrate its commitment to environmental protection, Mali has ratified several international conventions relating to the environment. In accordance with these international conventions, Mali has adopted national legal instruments on environmental protection.

The international agreements, conventions and treaties to which Mali has subscribed and which may be related to the project are indicated in the table below.

Table 5. List of international agreements, conventions and treaties

Agreements, Conventions and Treaties	Date and place of adoption	Effective date	Date of ratification by Mali	Relevance to the project
Convention concerning the Protection of the	16/11/1972 in Paris	December 17, 1975	Ordinance No. 46/CMLN of 31/08/1973	In the event of the discovery of old objects within the perimeter of the work, the competent

Agreements, Conventions and Treaties	Date and place of adoption	Effective date	Date of ratification by Mali	Relevance to the project
World Cultural and Natural Heritage				department will be involved in the procedure for the protection of the site concerned.
International Plant Protection Convention	06/12/1971 in Rome	April 03, 1952	Decree No. 85/PG-RM of 24 March 1986	The clearing of brush on the sites will have an impact on the existing vegetation. However, measures will be taken to spare plant species.
Convention on Biological Diversity	12/06/1992 in Rio de Janeiro	September 29, 1994	Decree No. 94-222/P-RM of 24 June 1994	Land clearing on the site could impact the biological diversity in the area. However, steps are being taken to reduce the impact of the project on the biological components
United Nations Framework Convention on Climate Change	09/05/1992 in New York	March 21, 1994	Decree No. 94-447/P-RM of 28 December 1994	During the project phases, there will be emissions of CO2, which is a greenhouse gas. It is considered one of the elements that contribute to global warming.
African Convention for the Conservation of Nature and Natural Resources	15 September 1968 in Algiers	June 16, 1969	Ordinance No. 39/CMLN of 16/09/1972	The opening and exploitation of the quarries will contribute to the modification of the natural environment in the area. Forest resources will be impacted within the scope of activities.
United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa	14/10/1994 in Paris	December 26, 1996	Decree No. 95-166/P-RM of 14/04/1995	As Mali is a country in the Sahel affected by desertification, any destruction of vegetation cover, no matter how small, is detrimental to the environment.
Kyoto Protocol on the United Nations Framework Convention on Climate Change	11/12/1997 in Kyoto	February 16, 2005	Decree No. 02-058 /P-RM of 11/02/2002	During the project phases, there will be emissions of CO2, which is a greenhouse gas. It is considered one of the elements that contribute to global warming.
Vienna Convention for the Protection of the Ozone Layer	22/03/1985 in Vienna	September 22, 1985	Decree No. 93-473 /P-RM of 29/12/1993	
Montreal Protocol on Substances that Deplete the Ozone Layer and its amendment adopted in London on 29/06/1990	16/09/1987 in Montreal	January 1, 1989		
Paris Climate Agreement adopted on 12/12/2015 by the 21st session of the Conference of the Parties to the Framework Convention on Climate Change (COP21) and the 11th session of the COP serving as the meeting	12/12/2015 in Paris	-	Decree No. 2016-0721/P-RP of 15/09/2016	The project's contribution to the effects of climate change is reflected in the CO2 emitted by the various machines used on the sites (generators, machines, etc.). With the application of the proposed mitigation measures, the negative impact will be reduced to an acceptable level.

Agreements, Conventions and Treaties	Date and place of adoption	Effective date	Date of ratification by Mali	Relevance to the project
of the Parties to the Kyoto Protocol (CMP), held in Paris from 30/11 to 12/12/2015				

Source: AEDD

5. Institutional framework:

The technical services attached to the ministerial departments, private institutions and civil society organizations that will be involved in the management of the environmental and social monitoring of this project are the following:

5.1. Ministry of the Environment, Sanitation and Sustainable Development

This Ministry acts through the National Directorate of Sanitation, Pollution and Nuisance Control (DNACPN); the General Directorate of Water and Forests (DGEF), the Agency for the Environment and Sustainable Development (AEDD).

National Directorate for Sanitation and Control of Pollution and Nuisances

Created by Ordinance No. 98-027/P-RM of 25 August 1998, its mission is to draw up the elements of the national policy on sanitation and the control of pollution and nuisances and to ensure their implementation. As such, it is responsible for:

- monitoring and ensuring that environmental issues are taken into account in sectoral policies and development plans and programmes and that measures are implemented in this area;
- to ensure the supervision and technical control of Environmental and Social Impact Assessment (ESIA) procedures;
- to develop and ensure compliance with national standards in terms of sanitation, pollution and nuisances;
- to ensure the control and compliance with legislation and standards in terms of sanitation, pollution and nuisances;
- to provide training and awareness to citizens on the problems of insalubrity, pollution and nuisances, in relation to the structures concerned, local authorities and civil society;
- to ensure in conjunction with the structures concerned, the monitoring of the country's environmental situation.

Directorate-General for Water and Forests

Created by Ordinance No. 2023-006/PT-RM of February 10, 2023, its mission is to develop the elements of the national policy on securing classified areas and protected forest areas, conserving water, soil, forests, wetlands, combating desertification, sustainable management of wildlife and forests, preservation of the biological diversity of species of wild fauna and flora, promotion and enhancement of forest and fauna products and ensuring the coordination and control of its implementation. As such, it is responsible for:

- design, monitor implementation and evaluate strategies and programmes for securing forests, wildlife and protected areas;
- to fight against desertification, the management of forests, wetlands and protected areas;
- to promote and enhance forest products, wildlife and protected areas;
- to conserve water, soil and restore forest areas, the banks of watercourses and their watersheds;

- to ensure the application of legislative and regulatory texts relating to the exploitation and movement of wildlife and forest products;
- issuing permits for the exploitation and transport of wildlife and forest products;
- to combat logging, illegal trafficking, poaching, illegal possession and circulation of wildlife specimens;
- to record and punish offences in forestry and wildlife matters in accordance with the texts in force;
- to contribute to the exchange of intelligence in the field of defence and security;
- to contribute to the fight against wildlife crime;
- to ensure the reparation of the damage and damage, duly noted, caused to protected areas, classified and protected forest estates;
- to contribute to the promotion and development of ecotourism and the security of archaeological sites in the forest and wildlife fields;
- to encourage users to develop and repopulate protected areas;
- to contribute to the development and implementation of national standards for the management and sustainable use of forests and wildlife conservation areas;
- centralize, process and disseminate information and statistical data relating to forest resources and wildlife and their habitat;
- Provide advisory support to communities on the sustainable management of wildlife and forest resources.

Environment and Sustainable Development Agency
Created by Law No. 10-027/P-RM of 12 July 2010, its mission is to:

- ensure the coordination of the implementation of the PNPE,
- to strengthen the capacities of the various actors involved in the management of environmental issues through training, information, education and communication,
- to mobilise the necessary funding for the implementation of programmes and projects through existing mechanisms.

The creation of this agency has made it possible to ensure better monitoring of the implementation of agreements, conventions and treaties on the environment and to establish the necessary synergy in the interventions of the various actors.

5.2. Ministry of Mines:

National Directorate of Geology and Mines:
Created by Law No. 90-105/AN-RM of 11 October 1990, its mission is to develop the elements of national policy in the field of research, development, exploitation and transformation of subsoil resources; but also to ensure the coordination and control of the regional and sub-regional services, the attached services and the public or private bodies that contribute to the implementation of this policy. To accomplish this mission, it is responsible for:

- to search for and centralize all documentation on geological, mining and petroleum research;
- to search for and centralize all documentation on mining and oil exploitation;
- identifying, storing and managing technical reports and magnetic media;
- to set up databases;
- to build up a collection of mineralogical, lithological and paleontological specimens;
- to carry out the computer processing of data;

- Contribute to the production of technical reports;
- to produce the necessary materials for research and the promotion of mining and oil activity;
- to keep statistics;
- to study files relating to applications for mining titles and industrial quarries;
- to ensure the updating of the mining cadastre and the mining conservation register;
- to collect the fees for the issuance and royalty of mining titles and quarry operating authorizations, royalties and taxes related to classified establishments and installations in relation to the board;
- to participate in the setting of the selling prices of mining and petroleum products in Mali;
- to develop, investigate and monitor cooperation files;
- to monitor and analyse the evolution of the prices of mineral and petroleum substances on the international market;
- to study the prospects of the mining and petroleum sector at the national and international levels;
- to ensure the updating of Mali's mining and petroleum codes and the law on classified installations;
- developing, monitoring and controlling mining inventory and geological mapping programmes;
- monitoring and controlling the activities of research, geological and mining exploration companies;
- to establish the file of indices;
- to centralize the results of geological and mining research work on the national territory and to participate in the synthesis of geological data and the updating of the geological map;
- to examine any file relating to research activities;
- to carry out or have carried out work on fundamental geology and related publications;
- monitoring and controlling the activities of mining companies;
- to control the application of the regulations on mines and their dependencies;
- monitoring and controlling mining activities in mines, quarries and their dependencies;
- to analyse the feasibility studies and activity reports of the operating companies;
- to analyse the reports of the boards of directors of operating companies;
- assess the socio-economic impact of mining activities;
- to investigate files relating to the marketing and quality control of precious and semi-precious stones;
- to investigate any file relating to operating activities;
- to examine the files of classified installations other than those relating to liquid, solid or gaseous hydrocarbons;
- to participate in the analysis and evaluation of files relating to mining environmental impact studies;
- to monitor the application of the regulations on classified installations other than hydrocarbons;
- to ensure the surveillance of classified facilities on environmental, health and safety standards;
- to participate in the monitoring and control of the environmental impact of mining projects and classified facilities;
- to ensure the implementation of the recommended mitigation measures;
- to investigate cases relating to civil explosives and accessories;
- to establish research programmes for hydrocarbons, bituminous rocks and asphalt rocks and to ensure that their implementation is monitored within the framework of the oil inventory;
- to participate in the evaluation of any feasibility study in the field of liquid, solid or gaseous hydrocarbons;

- to participate in the preparation and synthesis of all documents relating to hydrocarbons;
- to participate in the quality control of petroleum products in Mali;
- to participate in the definition of petroleum product standards in Mali;
- to examine the files of classified establishments and installations relating to liquid, solid or gaseous hydrocarbons;
- to monitor the application of the regulations on vapour and gas pressure vessels.

5.3. Ministry of Territorial Administration and Decentralization:

General Directorate of Local Authorities:
Created by Law No. 2011-053 of 28 July 2011, its mission is to develop the elements of the national policy for the decentralization of the Territory and participation in its implementation and to ensure the coordination and control of the action of the administrative authorities, services and public bodies involved in the implementation of this policy. As such, it is responsible for:

- to contribute to the definition of strategies for the implementation of territorial decentralization;
- to participate in the development of tools for the exercise of supervision over local authorities;
- defining, monitoring and applying the regulations relating to local authorities;
- to participate in the implementation and monitoring of the transfer of competences and the evolution of property and assets to local authorities in liaison with the ministries concerned;
- to monitor the exercise of the supervision of local authorities and the legal regularity of the acts of supervision of State representatives;
- to carry out studies for the improvement and strengthening of decentralization;
- to participate in the drafting of legislation on local and regional planning;
- to promote solidarity between local authorities;
- to promote and evaluate decentralised cooperation actions and cooperation actions between local authorities;
- to promote and organize technical and financial support to local authorities in the fields of administration and development.

5.4. Ministry of Agriculture

National Directorate of Agriculture
Created by Law No. 05-012 of 11 February 2005 establishing the National Directorate of Agriculture, its mission is to develop the elements of the National Agricultural Policy and to ensure the coordination and control of its implementation.

To this end, it is responsible in particular for:

- design and monitor the implementation of measures and actions to increase production and improve the quality of agricultural, food and non-food goods;
- to ensure the promotion and modernization of agricultural sectors;
- design and monitor the implementation of training, advice, extension and communication actions for farmers;
- to develop and ensure the application of regulations relating to phytosanitary control and the packaging of agricultural products;
- participate in the definition and application of agricultural research policy;
- develop and implement measures for the enhancement and promotion of harvested products;
- contribute to the design and implementation of the human resources training policy in the agricultural sector;

- participate in the development and monitoring of quality standards for agricultural products and inputs;
- ensure the collection, processing and dissemination of data in the agricultural field.

5.5. Ministry of Urban Planning, Domains, Housing, Regional Planning and Population:

National Directorate of Spatial Planning:
Created by Ordinance No. 04-009/P-RM of 25 March 2004, ratified by Law No. 04-025 of 16 July 2004, its mission is to develop the elements of the National Spatial Planning Policy and to ensure its implementation. As such, it is responsible for:

- to develop and implement the National Territorial Development Plan;
- coordinating and harmonising spatial planning schemes at national, regional and local level;
- to define at the national level, in conjunction with the other actors, the major centres of activity likely to ensure development and territorial balances at the demographic, economic and environmental levels;
- to set up and manage a geographic information system on Spatial Planning.

5.6. Ministry of Energy and Water:

National Directorate of Hydraulics:
Created by Ordinance No. 10-001/P-RM of 18 January 2010 ratified by Law No. 10-006 of 20 May 2010, its mission is to develop the elements of the national policy on hydraulics, the coordination and technical control of regional and sub-regional services and related services that contribute to the implementation of the said policy. As such, it is responsible for:

- developing strategies for drinking water supply, mobilization and management of water resources and ensuring their implementation;
- developing and enforcing standards governing the water sector;
- to make an inventory, evaluate and monitor water resources and hydraulic structures;
- planning, monitoring and developing the public water service;
- evaluating programmes and projects for the construction of infrastructure or hydraulic developments;
- to participate in the promotion of sub-regional cooperation in the field of water resources control and management.

5.7. Ministry of Security and Civil Protection:

General Directorate of Civil Protection:
Created by Law No. 06-004 of 6 January 2006, its mission is to develop the elements of the national policy on civil protection and to ensure the implementation of this policy. As such, it is responsible for:

- to organize and coordinate risk prevention and disaster relief actions;
- to participate in the development and implementation of emergency plans and the protection of people, property and the environment in the event of accidents, disasters and disasters, in conjunction with the other services concerned;
- to ensure public awareness and information;
- to participate in peace and humanitarian assistance actions;
- to participate in civil defence;
- to contribute to the training of personnel in charge of civil protection.

5.8. Department of Health and Social Development:

Directorate-General for Health and Public Hygiene :
Created by Law No. 2018-052 of 11 July 2018, its mission is to develop elements of the National policy on public health, public hygiene and sanitation and to ensure the coordination and control of regional services and related services that contribute to the implementation of this policy. To this end, it is responsible for:

- to design and develop strategies for disease control, reproductive health, nutrition and public hygiene, and sanitation;
- developing regulations and contributing to the development of standards and ensuring their implementation;
- to carry out all necessary studies and research;
- preparing projects, programmes and action plans and ensuring the implementation of such programmes;
- coordinating, supervising and monitoring the activities of the implementing units and evaluating their performance.

National Directorate of Social Protection and Solidarity Economy
Created by Ordinance No. 2016-002/P-RM of 15 February 2016, its mission is to develop the elements of the national policy on social protection and the solidarity economy and to ensure its implementation. As such, it is responsible for:

- to develop projects, programmes and/or action plans for the extension of social security schemes, social security, health insurance and social safety net mechanisms;
- developing, monitoring and evaluating projects, programmes and/or action plans for the expansion of the solidarity economy sector;
- to promote strategies for the extension of social security, social security, health insurance and social safety net schemes;
- coordinating, monitoring and evaluating the implementation of social protection programmes;
- to contribute to the development and capacity building of cooperative societies, social mutuals, associations and other groups;
- to contribute to the development of favourable conditions for access to microcredit for vulnerable groups;
- to draw up legislation and regulations relating to social mutual societies and cooperative societies;
- to ensure the application of the regulations relating to social mutual societies, cooperative societies, associations and other groups involved in the field of the social and solidarity economy.
- to contribute to the production of statistics with a view to establishing indicators of social security, health insurance and the social and solidarity economy;
- to carry out studies and research/development in the field of social protection and solidarity economy;
- to develop and update the national registers of beneficiaries of social protection and solidarity economy;
- to ensure the implementation of all measures relating to the improvement of the quality of social protection services.

5.9. Ministry of Handicrafts, Culture, Hotel Industry and Tourism:

National Directorate of Cultural Heritage
Created by Ordinance No. 01-027/P-RM of 2 August 2001, its mission is to implement the national policy in the field of cultural conservation, enhancement and promotion. As such, it is responsible for:

- to identify and inventory the elements of cultural heritage throughout the territory;
- protect, restore and promote the national cultural heritage;
- to ensure the dissemination of information on the national cultural heritage.

In addition to these ministerial departments, it is necessary to add civil society: local associations and technical and financial partners.

IV. Description of the initial state of the project environment

Knowledge of the initial environmental conditions relating to the project site is all the more important as it makes it possible to draw up a reference framework on the components of the environment that may be impacted by the activities carried out.

1. Biophysical environment:

1.1. Flora:

The types of plant formations encountered in the study area are as follows:

1.1.1. Woodland savannahs

In wooded savannahs, trees and shrubs form a generally light canopy that allows light to penetrate. The height of the tree stratum is 8 to 13 m. Within the wooded savannahs are scattered the gallery-type formations, hence their association.

With a fairly diverse floristic composition similar to that of riparian fringes, the wooded savannahs associated with galleries are mostly found in valleys.

The wooded stratum is composed of large class plants of *Pterocarpus erinaceus, Crossopteryx febrifuga, Lannea microcarpa, Lannea acida, Terminalia avicennioides, Terminalia macroptera, Afrormozia laxiflora, Fagara xanthoxyloides, Bombax costatum, Sterospermum kunthianum,* lianescent species such as *Saba senegalensis*, *Combretum paniculatum, Canthium cornelia, Baissea multiflora* etc. The herbaceous carpet, when it exists, is also abundant associated with the undergrowth, is always present and of quite diverse composition. *Grewia mollis*, *Hexalobus monopetalus, Strychnos spinosa* make up a large part of the undergrowth of the wooded savannahs of the area.

Photo 1. View of the wooded savannah

1.1.2. Wooded savannahs

This formation is also scattered in the wooded savannahs. Trees and shrubs intermingle in the grass mats. They are moderately numerous and reach 6 to 8 m in height.
The cover rate of woody plants is more than 30%. The wooded savannahs have a less diverse floristic composition and the tree stratum is essentially made up of large plants of combretaceae (*Combretum glutinosum*, *Combretum nigricans*, *Combretum velutinum*) to which must be added the *Pterocarpus erinaceus*, *Crossopteryx febrifuga*, *Hexalobus monopetalus*, *Terminalia*

avicennioids, *Terminalia macroptera*, *Lannea acida, Lannea velutina*, *Pteleopsis suberosa*, *Detarium microcarpum* etc.

This formation is the band that is found in the southern part and on the sides of the plateau extending to the river. There are tall grasses with a continuous herbaceous cover and exceeding 1m in height, notably composed of *Antropogon pseudapricus, Andropogon gayanus*, *Cymbopogon gigantus*, *Pennicetum pedicelatum*.

Photo 2. View of the wooded savannah

1.1.3. Shrub savannahs

The woody plants are represented only by shrubs and shrubs, scattered among the grass carpet and are found in small areas within the estate. They are characteristic of the northwestern formations.

In these formations, the rate of cover of woody trees does not exceed 30%. And the floristic composition is not very diverse. There are *Combretum glutinosum*, *Crossopteryx febrifuga*, *Terminalia macroptera*, *Terminalia avicennioids,* etc.

Photo 3. View of the shrub savannah

1.1.4. Bowes

These are the soils without wood cover scattered in shrub, tree and wooded savannahs. The bowes in the area are generally gravelly to rocky, ferralitic with a discontinuous herbaceous cover.

Photo 4. View of non-woody soil

1.2. Ecosystems near the site:

The ecosystem of the site includes at least two types of habitats, as follows:

- an area of the open waters of the Sankarani at the northern limit of the permit;
- areas of wooded banks of forest galleries along the watercourses that feed the Sankarani.

The transition to the river is gradual. The vegetation on the slopes of the plateaus was dense but is now very degraded due to human pressure.

The permit is also located in the northern Sudano-Guinean and Sahelian transition zone with rainfall greater than 1100mm (Source: Local Agriculture Service). It is characterized by two distinct natural environments, as follows:

- a wetland including the bed of the Sankarani and its floodplains;
- an uncovered area with savannah formations on the slopes and at the bottom of the plateaus.

1.3. Ecology and sensitivity of the identified ecosystems:

The ecosystems of the site and the bordering areas are made up of savannahs, galleries and riparian forests dotted on both sides of the watercourses and representing a certain ecological sensitivity. They are characterized by floodplains, wetlands and anthropogenic influence through agriculture and arboriculture.

Riparian forests:

Along the watercourses of the Sankarani watersheds stretches a strip of vegetation of variable width with a cover that is now very degraded with species particularly adapted to the permanent or temporary presence of water. The boundary of these riparian forests with the rest of the savannah forms a very interesting ecotone in terms of biological diversity.

They are home to bushbucks, red-sided duikers, monitor lizards, pythons and various snakes, and an important species of birds and reptiles, these formations are close links between streams and forest.

They protect watercourses from erosion and intense evapotranspiration and contribute to the maintenance of biological diversity. Riparian forests are very sensitive habitats and deserve special attention in conservation measures.

1.4. Forest Resources Inventory Results:

The systematic inventory has identified about 50 species. Average volumes vary from 66 to 78m3/ha (Source: forestry officers, 2025). The species are classified in the table below:

Table 6. List of woody species characteristic of the area

Scientific name	French name	Vernacular name	National status
Combretum nigricans	*Black Kinkeliba*	*Samabali, Tiangara bilen*	OE
Detarium microcarpum	*True kinkeliba*	*N'golobè*	EIP
Combretum glutinosum	*Tough Kinkéléba*	*Tiangarabé, Jamba*	OE
Terminalia macroptera	*Badamier sessile*	*Woloba ,Wolomuso*	OE
Acacia macroschya	*Not known*	*Nsofaragoni*	OE
Isoberlinia doka	*Sau, Doka, Sau, Abogo*	*Sô*	EVE
Entenda soudanica	*Entada of Africa*	*Samanérétiè*	OE
Pterocarpus eurinaceus	*Venes*	*Guénu*	EPP
Vitelaria paradoxa	*Shea*	*Shii*	EIP
Grewia bicolor	*Nogo white*	*Nogo-nogo-jè*	OE
Strychnos spinosa	*Bush orange tree*	*Nkantoroni, Gankoro*	OE
Crosopteris februufica	*Cinchona of goats*	*Balembo*	OE
Prosopis africana	*Not known*	*Guélé*	EPP
Lannea acida	*Acid Grape*	*Péku-gwelè*	OE
Daniela oliveri	*African balsam copalier*	*Sanan*	EVE
Pericopsis laxiflora	*False dalbergia*	*Kolokolo*	OE
Aacia seyal	*Spiny Mimosa*	*Sadjè*	EVE
Lannea microcarpa	*Real Grape Tree*	*Peku bâ,*	OE
Combretum paniculatum	*Red-flowered kinkeliba*	*Denbagnuman*	OE
Parkia biglbosa	*Nere*	*Nere*	EIP
Bauhinia thonningii	*Not known*	*Chifilè yirini*	OE
Afrormosia laxiflora	*Not known*	gorodjohi bodehi (Fulani)	OE
Lannea velutinum	*Hairy grape tree*	*Bakoropeku*	OE
Bombax costatum	*Red-flowered kapok tree*	*Bumu*	EPP
Stelopsis suberosa	-	*N'Téréni*	OE
Annona senegalensis	*Cinnamon apple from Senegal*	*Mandé sunsun*	OE
Ficus ithiophila	-	*Dubalen*	OE
Parinari curatelifolia	*White Stuffed Dog*	*Tutu ntamba*	OE
Trichilia emetica	*Mafura*	*Sula finzan*	OE
Sarcocephalus esculentus	*African peach*	*Baro*	OE
Burkea africana	*Not known*	*Siri*	OE
Lannea barteri/velutina	*Hairy grape tree*	*Bakoropeku*	OE
Gardenia sokotensis	*Gardenia de Sokoto*	*Farakolochi*	OE
Diospiros mespiliformis	*African ebony*	*Sunsunfi*	OE
Cassia sieberiana	*Sieber heist*	*Sindjanfingg*	OE
Lophira lanceolata	*False shea, Savannah azobé*	*Manan, Shi sina*	OE
Ximenia amercana	*Wild olive tree*	*N'Tonguè*	OE
Acacia sieberiana	*Wadi Acacia*	*Bakijè Baki*	OE

Scientific name	French name	Vernacular name	National status
Mitragina inermis	*Elephant's foot*	*Djun,Jun,*	OE
Gardenia eribecens	*Not known*	*M'Burémuso*	OE
Opilia celtidifolia	*Blackthorn and vine*	*Solaminkon*	OE
Stereospermum kunthianum	*Mogo jiri*	*Savannah lilac*	OE
Afzelia africana	*Lingué Doussié*	*Lingué*	EPP
Combretum velutinum	-	*N'ganiaka*	OE
Hexalobus monopetalus	*Not known*	*Samabolokoni,Fugganijè*	OE
Tamarindus indica	*Tamarind*	*N'Tomi*	EIP
Vitex doniana	*Black plum tree*	*Koronifin*	OE
Khaya senegalensis	*African mahogany*	*Jala*	EPP
Sarcocephalus latifolius	*African peach*	*Baro*	OE
Stricknos spinosa	*Bush orange tree*	*Nkantoroni, Gankoro*	OE

Source: Inventory results of forestry officers, 2025

EIP=Species fully protected by Malian law
EVE=Species of Economic Value
EPP = Partially Protected Species
ENP=Non-protected species

NB: Of the 50 species encountered, four (4) are fully protected species by Law No. 10-028 of 12 July 2010 determining the principles of management of the resources of the national forest domain. These are *Vitellaria paradoxa*, *Parkia biglobosa*, *Tamarindus indica* and *Detarium microcarpum*. The fifteen (15) species characteristic of the environment are: *Combretum nigricans*, *Detarium microcarpum*, *Terminalia macroptera*, *Combretum glutinosum*, *Acacia macroschya*, *Isoberlinia doka*, *Entenda soudanica*, *Pterocarpus eurinenceus*, *Vitelaria paradoxa*, *Grewia bicolor*, *Stricknos spinosa*, *Crosopteris februufica*, *Prosopis africana*, *Lannea acida*, *Daniela oliveri*.

1.5. Freshwater flora:

The freshwater flora is represented by invasive species, such as *Mimosa pigra* and tiphas.

1.6. Endemism:

The national territory is home to 8 (eight) internationally endemic species, namely: *Maerua waillyi*, *Elatine fauquei*, *Pteleopsis habeensis*, *Hibiscus pseudohirtus*, *Acridocarpus monodii*, *Gilletiodentron glandulosum*, *Brachystelma medusanthemum*, *Pandanus raynalii*. They are included in the documents of the National Strategy for Biological Diversity in Mali, drawn up in 2000. It appears that at the end of the inventory, none of these species was identified in the permit.

1.7. Fauna:

All the sites assessed were areas rich in wildlife (according to field surveys). Among the main species that inhabited these natural environments were the horse antelope (*Hippotragus equinus*), the bushbuck (*Tragelaphus scriptus*), the damalisque (*Damaliscus korringum*), the Buffon's cob (*Kobus kob*), the common guinea fowl (*Numida meleagris*), the common francolins (*Francolinus bicalcartus*) and the Nile monitor lizards (*Varanus niloticus*) and seba pythons (*Python sebae*) etc. i.e. more than 50 animal species. Today, with the presence of humans (gold miners, breeders and farmers), only small fauna is visible on the site (hares, green monkeys and squirrels).
The most common animal species in the area are shown in the following tables:

Table 7. List of mammals encountered in the area

Scientific name	French name	Vernacular name	IUCN Classification
Atelerix albiventris	Harder	-	LC
Cephalophus rufilatus	Red-sided cephalophus	Kokunani	LC
Chlorocebus or Cercopithecus aethiops	Green monkey, vervet or grivet.	N'gobani	LC
Cricetomys gambianus	Gambian rat	Tôto	LC
Erythrocebus patas	Red Monkey	Warabilén	LC
Felis silvestris	Wild cat	-	LC
Gazella rufifrons	Rufous-fronted gazelle	Sinè	CONSIDERING
Genetta genetta	Common Genet	Seribani kandjan	LC
Heliosciurus gambianus	Helioscide of the Gambia	N'tolo	LC
Hippopotamus amphibius	Hippopotamus	Mali, malo	CONSIDERING
Hystrix cristata	Porcupine	Bala	LC
Kobus ellipsipymnus	Waterbuck	Sinsin	LC
Orycteropus afer	Orduckroop	Timba	LC
Sylvicapra grimmia	Grimm's cephaloph	Mangalani	LC
Tragelaphus scriptus	Bush buck	Minan	LC
Xerus erythropus	Burrowing squirrel or palm rat	N'guèlèni	LC

Source: Inventory results of forestry officers, 2025

LC: Least Concern
CEW: Threatened
NA: Not applicable

Table 8. List of reptile and amphibian species found in the area

Scientific name	French name	Vernacular name	IUCN Classification
Agama agama	Agama lizard	Bassa	LC
Centrochelys sulcata	Land or spurred turtle	Korokara	CONSIDERING
Crocodylus niloticus	Crocodile	Bama	LC
Varanus niloticus	Nile monitor lizard	N'kana	NA
Varanus exanthematicus	Savannah monitor lizard	N'koro	LC
Python sebae	Python de seba	Minian	NA
Bitis arietans	Bumping Viper	Dankalan	NA
Cerastes vipera	Horned viper	Bèlèwoyo	NA
Chamaeleo africanus	Common chameleon	Nonchi	LC

Source: Inventory results of forestry officers, 2025

Table 9. List of bird species found in the area

Scientific name	French name	Vernacular names	IUCN Classification
Tockus erythrorhynchus	Red-billed hornbill	N'Dolé da blen	Least Concern
Aigretta garzetta	Little egret	Gounadjè	Least Concern
Streptopelia senegalensis	Laughing dove	Toubani	Least Concern
Scorpus umbretta	Ombrette	Not known	Least Concern
Toctus nasutus	Black-billed hornbill	N'Dolé da fima	Least Concern
Streptopelia semitorquata	Collared Dove	Toubani kanfun	Least Concern
Centropus senegalensis	Senegalese coucal	-	Least Concern
Ardea goliath	White-throated Egret	Gounadjè	Least Concern
Ardeola ibis	Heron Cattle Egrets	Gounadjè	Least Concern
Vanellus tectus	Black-headed Lapwing	Toumè toumè	Least Concern

Passer griseus	Grey Sparrow	-	Least Concern
Ploceus cucullatrus	Village Weaver	-	Least Concern
Lamprotornis caudatus	Long-tailed metallic blackbird	-	Least Concern
Lamprotornis chalybaeus	Short-tailed metallic blackbird	-	Least Concern
Corvus albus	Magpie crow	Gangan	Least Concern
Quelea quelea	Red-billed worker	-	Least Concern

Source: Inventory results of forestry officers, 2025

As far as the fish fauna is concerned, it has been noted that the fish of the river come up during periods of high water (the flood), but with the intense gold panning activity at the level of the Sankarani, the fish are becoming scarce in the water points.
Finally, surveys of a few fishermen have identified thirteen species of fish (see table below).

Table 10. List of fish species in the area

Scientific name	French name	Vernacular name	IUCN Classification
Brycinus nurse	Feeder tetra	N'zara ku blén	Least Concern
Bagrus bayad macropterus	Catfish	Samu djè	Least Concern
Chrysichthys nigrodigitatus	Bluefin tuna	N'kèrè djè	Least Concern
Heterotis niloticus	African Arowana	Freak	Least Concern
Synodontis batensoda	*Upside-down catfish*	*Konkon djè*	Least Concern
Sarotherodon galilaeus	*Mango tilapia*	*N'tèbèn*	Least Concern
Tilapia dageti	*Tilapia*	*Taka*	Least Concern
Tylochromis jentinki	*Ray-finned fish*	*Sandola*	Least Concern
Citharinus citharius	Sunfish or mleke	Talan	Least Concern
Clarias gariepinus	Sharp-toothed catfish	Manogo	Least Concern
Auchenoglanis occidentalis	*Auchenoglanis occidentalis*	Korokoro	Least Concern
Labeo senegalensis	African Lab	Bama djè	Least Concern
Lates niloticus	Captain / Nile Perch	Salen	Least Concern

Source: Inventory results of forestry officers, 2025

NB: In the area, wildlife continues to be under strong pressure from various sources, the most important of which are: (i) gold panning and the use of dredgers in the riverbed, (ii) the transhumance of domestic animals, (iii) the resurgence of bush fires, (iv) the persistence of poaching, (v) the capture of birds with nets around water points in the dry season and (vi) the extension of cultivated areas to the detriment of forests.

1.8. Location of the site in relation to national protected areas:

After field investigations, it was found that the operating permit is neither located in a protected area nor in a classified forest. As a reminder, Mali has 26 protected areas and 106 classified forests (source DGEF, 2025).

1.9. Hydrography:

The hydrographic network of the area is essentially made up of two tributaries of the Niger River: the Sankarani and the Wassoulou Ballé. The operating permit is devoid of watercourses.

NB: the distance between the plant and the nearest watercourse is about 2 km. The quarry is even further away.

1.10. Relief:

The relief of the area is formed by lateritic plateaus, valleys and plains. The more or less hard formations form small hills with a difference in altitude of 50 m. The average altitude in the area reaches 250 m.

1.11. Climate:

The climate is that of the pre-Guinean zone with two well-marked seasons, a rainy season of 5 months (May to September) and a dry season of 7 months (October to April). The dry season is divided into two periods: a cool period with temperatures reaching 10 to 15°C at night and around 35°C during the day and a hot period, where temperatures do not fall below 30°C and exceed 40°C in April and May. Annual rainfall reaches 1200 mm. The rainiest month is August with an average of around 278 mm. The wind directions are from northeast and east, between December and March, and from south to southwest and also from west, between April and October (Source PDESC).

1.12. Climate change trends in the area:

Like other regions of the country, the study area is also confronted with the effects of climate change, which are becoming more and more accentuated, making it difficult to develop economic activities. The main trends observed by the populations are:

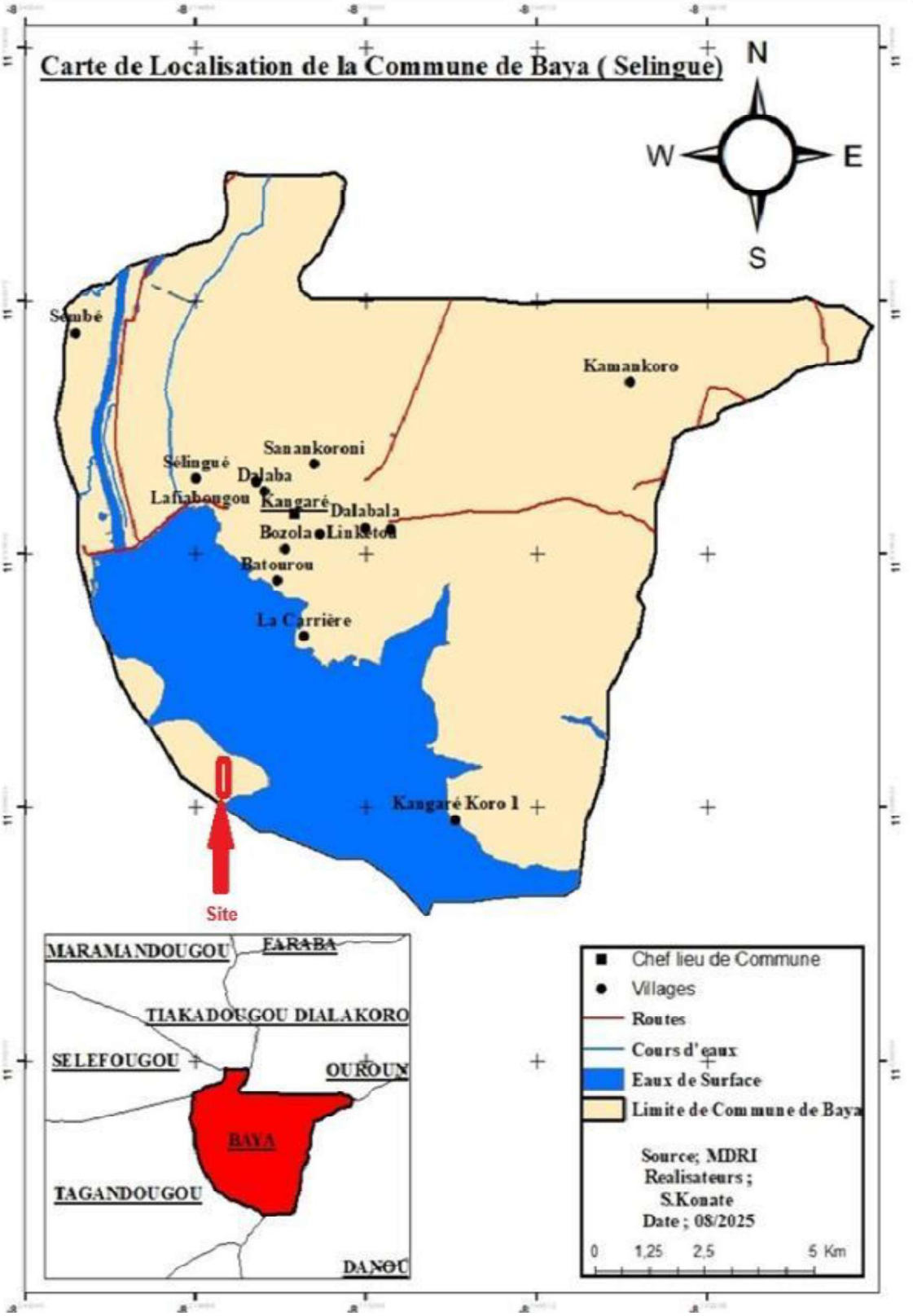
- a regular decrease in the amount of rain and a spatio-temporary variation;
- strong solar radiation throughout the year with little differentiation in average temperatures;
- early drying up of secondary watercourses.

These trends have had a negative impact on the activities of the primary sector (agriculture, livestock and fishing).

2. Human/socio-economic environment:

2.1. Administrative context of the study area:

The project is located in the rural commune of Baya (Sélingué circle) in the Bougouni region. (See map of the commune below).



Map 1. Location map of the rural municipality of Baya

2.2. Demographic aspects

The commune has the following demographic characteristics:

- a young and slightly female population;
- ethnic diversity;
- an agro-sylvo-pastoral vocation;
- a predominantly Muslim population.

The main ethnic groups encountered in the commune are: the Fulani, the Malinké, the Bambaras, the Bozos, the Dogon and the Soninke.

The rural exodus is practiced by young people. The migratory movement is mainly to Côte d'Ivoire, Guinea Conakry, Central African countries, Spain and inland cities such as Bamako, Sikasso, Koutiala and Kayes.
Population statistics are shown in the table below.

Table 11. Statistics of the population of Dalaba and the commune by Baya

Municipalities/Villages	Sex	Population statistics	Percentage M & F
Dalaba	Men	2098	49%
	Wives	2189	51%
	Total	**4287**	-
Rural municipality of Baya	Men	15788	50%
	Wives	15996	50%
	Total	**31784**	-

Source: SLPSIAP, 2024

2.3. Economic activities:

2.3.1. Agriculture

Agriculture is widely practised in the area. It is the main income-generating activity of the population. The main speculations cultivated by family production units are:

- cereal crops: maize, sorghum, millet, fonio, groundnuts, rice;
- market gardening: okra, shallots, chilli, cabbage, tomatoes, eggplants;
- fruit production: mango, orange, mahogany.

Table 12. Agricultural production

Speculation	Total production (tonnes)	Developed area (in ha)	Yield (kg/ha)
Rice nerica	345	115	3 000
Bashin rice	8 695	2350	3 700
Maize	6 663	1 850.75	3 600
Sorghum	171	175	980
Millet	91	95	960
Peanut	212	250	985
Pure cowpea	151	275	550
Associated cowpea	103	215	480
Voandzou	32	50	650
Hybridized corn	663	102	6 500

Source: Agriculture Subsector, 2024

Market gardening is practiced on a small scale. The non-development of this sub-sector of activity is explained by the fact that women have turned to gold panning. In many villages, market gardening areas have been abandoned.

Table 13. Vegetable production

Speculation	Total production (tonnes)	Developed area (in ha)	Yield (kg/ha)
Tomato	450	30	15 000
Onion	300	15	20 000
Okra	960	80	12 000
Lettuce	15	3	5 000
Eggplant	150	30	15 000
Cabbage	300	15	20 000
Madison	105	15	15 000
Potato	10	50	20 000
Chili pepper	105	15	5 000
Shallot	75	5	15 000
Watermelon	400	20	20 000
Squash	200	10	20 000

Source: Agriculture Subsector, 2024

2.3.2. Breeding

Livestock farming plays an essential role in the local economy and is a means of saving money for the population. It is extensive and employs almost the entire working population.
The herd is mainly composed of: cattle, sheep, goats, donkeys and poultry.
In some villages, women play a significant role in the livestock sector through the fattening of small ruminants.

Table 14. Livestock size

Animals	Estimated number
Cattle	9 750
Sheep	3 730
Goats	4 110
Asses	825
Poultry	132 000

Source: Local Veterinary Service, 2024

2.3.3. Fishing

Fishing is a developed and permanent activity in the area. There are two types of fishing practice that vary according to the period:

- subsistence fishing with rudimentary tools: the dormant net, the longline, the trap, the line during the flood;
- intense fishing with the sparrowhawk net during the flood recession.

Fish production is intended for marketing and self-consumption. The Sankarani and the Wassoulou Ballé are the main fishing areas.
The main places where fish are sold are: Bamako, Sikasso, Bougouni, Yanfolila and Ouélessébougou.

2.3.4. Forest Resources

As in most rural areas, the transformation and use of forest resources is important for the livelihood of local people.
Depending on the type of use, vegetation products can be classified into: grasses, wood, foliage, fruits, oilseeds, gums, fibres, and medicinal products.

- **Wood**

In addition to its use as a source of energy by the population, wood is used in fences, homes, roofs, etc. It is derived mainly from: *Isoberlinia doka, Daniellia oliveri*, *Anogeissus leiocarpus*, *Cordyla pinnata*, *Pterocarpus erinaceus*, etc.
The marketing of wood and charcoal is highly developed. They are sold at the local market or transported in most cases to Bamako.

- **Fruits and oilseeds**

The vegetation of the area contains a wide range of food-producing species. Fruit trees help supplement staple foods, maintain a balanced diet throughout the year, and provide food in times of scarcity. The different species concerned are: *Vitellaria paradoxa*, *Parkia biglobosa*, *Ziziphus mauritiana*, *Tamarindus indica, Adansonia digitata* and *Lannea microcarpa*.

- **Herbs**

Grasses are used as fodder; in addition to this, some are used in the construction of roofs, granaries and huts. We have *Andropogon gayanus*, *Andropogon pseudapricus*.

- **Food and medicinal plants**

Natural formations offer a wide range of medicinal and food plants that are effective against several diseases, depending on how they are used. These plants and how to use them are as follows:

- *Tamarindus indica* (tomi): the pod-shaped fruits are used in millet porridge, the manufacture of tamarind juice, consumed in all regions of the country; the fruits soaked and macerated in water are a powerful laxative; the leaves are used in traditional medicine;
- *Detarium microcarpum* (tamba coumba): it produces dried fruits, eaten in their natural state;
- *Saba senegalensis* (zaban): vine whose fruits are eaten either in their natural state, in zaban juice or in the preparation of millet porridge;
- *Combretum micranthum*: (n'golobè): treatment of hypertension by leaf decoction;
- *Combretum glutinosum*: (tchangarableni): treatment of constipation from decocted leaves;
- *Anogeissus leiocarpus*: (n'galama): treatment of yellow fever or malaria from a decoction of the leaves.

2.3.5. Handicrafts and trade

Commercial activity is mainly based on forestry, livestock, agriculture and fishing products. The most important weekly fair in the municipality is the Dalabala Market.
With the development of livestock markets in the area, the export of animals to Guinea and Côte d'Ivoire has become a very important commercial activity in the commune.
Handicrafts are not well developed in the area. However, there are some jewellers, shoemakers, blacksmiths, carpenters who are faced with the lack of funding and supervision.

2.3.6. Gold panning

Gold panning is a very widespread activity and practiced by many people during the dry season. We are seeing more and more women and children on gold panning sites.
Gold miners are organized within the "Tomboloma" which are local organizations under the authority of traditional chiefs and community leaders.

The impacts of gold panning are visible within the company's operating permit in terms of destruction of forest resources, disturbance of natural habitats and soil degradation.

2.4. Infrastructure and social facilities:

2.4.1. Roads and accessibility

The internal road network is made up of rural tracks that connect the villages to the capital of the commune. The condition of the tracks is poor, which is an obstacle to the sale of local products and the movement of people, especially during the rainy season.

2.4.2. Health Center

The sanitary facilities in the study area are shown in the table below.

Table 15. Sanitary infrastructure

Municipality/village	Number of infrastructures			
	CSRef	CSCOM	Maternity	Clinics
Rural municipality of Baya	1	4	20	0
Dalaba	0	0	1	0

Source: CESCR

The most common diseases are: malaria, typhoid fever, acute respiratory infections, diarrhoeal diseases, skin diseases, sexually transmitted infections, child malnutrition.

2.4.3. Hydraulic equipment

Despite the abundance of groundwater and surface water resources, the populations of the area are facing difficulties in the supply of drinking water. The water supply networks installed in the commune seem to be insufficient, the populations are supplied by boreholes and traditional wells which often dry up in the dry season.

The main hydraulic equipment existing in the area is shown in the table below.

Table 16. Hydraulic equipment

Municipality/village	Number of hydraulic equipment				
	AES	Drilling	Large diameter well	SHVA	Traditional wells
Rural municipality of Baya	6	46	39	20	-
Dalaba	0	2	0	0	10

Source: CESCR

2.4.4. Education and schools

The commune has several schools (preschool, public, private, community, madrasas). The following table shows the number of schools.

Table 17. Schools

Municipality/village	Number of schools									
	Preschool		Public		Community		Private		Madrasas	
	1st cycle	2nd cycle	1st cycle	2nd cycle	1st cycle	2nd cycle	1st cycle	2nd cycle	1st cycle	2nd cycle
Rural municipality of Baya	6	0	16	8	9	0	10	6	13	3
Dalaba	0	0	0	0	1	0	0	0	0	0

Source: CAP, 2024

The main difficulties relating to the schooling of children are mainly related to the following factors:

- the absence of public schools in some villages;
- the inadequacy of financial means to cover school fees;
- the lack of financial resources for the support of teachers at the community school level;
- the lack of financial and material support from partners such as NGOs;
- the use of gold panning sites by children (school dropout).

IV. Public consultation

1. Introduction:

In accordance with the provisions of Interministerial Order No. 2013 - 256/MEA-MATDAT-SG of 29 January 2013 setting out the terms and conditions of the public consultation on environmental and social impact studies, a public consultation was organized on 06/03/2025 in Kangaré (capital of the municipality). Were present (see the attendance list in the appendix).

2. Objectives:

The main objectives of the public consultation were:

- to inform the surrounding populations about the Massala small-scale gold mine project and to explain the impacts of the project on the biophysical and human/socio-economic environments;
- gather the opinions, concerns and expectations of stakeholders;
- to collect their proposals for solutions to the impacts related to the project or to strengthen the benefits that may result from it;
- identify measures to mitigate and/or compensate for adverse impacts on the basis of proposals for solutions made by stakeholders;
- to propose the actions to be put in place to mitigate the negative impacts;
- and finally to ensure the support of the populations for the project.

3. Methodology:

As part of the preparation of the public consultation, the Consultant made contact with all stakeholders. This is how he met:

Meetings with the authorities and traditional legitimities:

From January 17 to 18, 2025, the consultant paid a courtesy visit to the village chief of Dalaba and the chief of the hamlet of Massala. The purpose of these meetings was to prepare community representatives for their participation in the public consultation.

Contacts with the administrative and municipal authorities:

In order to better organize the public consultation meeting, the consultant contacted all the authorities concerned from February 3 to 4, 2025:

- the chief of staff of the governorate of Bougouni;
- the prefect of Sélingué;
- the sub-prefect of Sélingué;
- the mayor of the rural commune of Baya.

Working session with the DRACPN of Bougouni:

In collaboration with the Regional Directorate of Bougouni, the consultant worked on the practical organization of the public consultation. Thus, the date and place of the meeting were set and the information was sent to all stakeholders.

4. Summary of stakeholders' concerns and expectations:

The table below summarizes the main concerns and expectations of stakeholders.

Table 18. Key concerns and expectations from the public consultations

Commune	Date of public consultation	Chairperson of the session	Number of participants	Key stakeholder concerns and expectations
Baya	06/03/2025	Mayor of the municipality of Baya	38	- the employment of local young people; - compliance with the mine closure plan; - the preservation of watercourses.

Source: Minutes of the public consultation

5. Conclusion:

The holding of the public consultation made it possible to ensure the support of the population and local authorities for the project.

Photo 5. Some views on the public consultation meeting in Kangaré

V. Project Alternatives

1. Select options:

The project, due to its planned mode of exploitation, constitutes an alternative to artisanal gold panning which is spreading destructively in the area. The components of the project have been chosen in such a way as to comply with environmental requirements in terms of:

- compliance with the laws and regulations in force in the country;
- the location of infrastructure;
- the method of extraction and the process of processing the ore;
- access to the site;
- waste rock deposits and mud pond water.

1.1. Legal and regulatory framework:

All legal provisions have been complied with by the company from the obtaining of the exploration permit (Cf. Order No. 2018-3516/MMP-SG of 05 October 2018) through the exploration work to the introduction of this Environmental and Social Impact Studies. At every stage of the process, the actors concerned were involved.

1.2. Location of the infrastructures:

1.2.1. Career

At the end of the exploration work, an area was chosen (Massala) because of its gold potential, easy access to the site, and the remoteness of the rivers. There are no villages in the quarry's right-of-way, nor are there any other types of facilities.

1.2.2. Factory and remote site

The site to house the factory and the base camp is sparsely wooded compared to the rest of the permit and the infrastructure is far from the waterways. The sludge basin device is installed within the plant in such a way as to evacuate the water in the opposite direction of the flow to the watercourses.

Surface water will not be used to supply water to the site. It is planned to drill boreholes to ensure the water needs of the plant and the base camp.

1.3. Ore extraction:

As the ore is not very consolidated, the method chosen by the project is open-pit mining. There will be no use of explosives.

1.4. Ore Processing Process:

Given the composition of the ore, the processing method chosen is *gravimetric separation*. There will be no use of chemicals.

1.5. Access to the sites:

There will be no opening of new access tracks. Those already existing will be maintained and maintained periodically by the company.

1.6. Waste rock deposits:

Waste rock will be placed around the excavation areas to facilitate reuse during the mine closure phase.

1.7. Mud basin water:

After the settling stages at the level of the mud basin, the water can be discharged into the natural environment without inconvenience. In addition, they do not contain chemicals.

Table 19. Select options

Designations	Options Selected	
	Benefits	Disadvantages
Quarry location	- access to the site is easy; - the quarry is far from the waterways; - the village terroir is spared.	- the risk of felling trees; -the risk of disturbance of wildlife habitats.
Factory and base camp location	- the space is optimized; - the area is sparsely wooded; - the site is far from watercourses; - the water from the mud basin is evacuated away from the watercourses; - The watercourses are not used for the water needs of the factory and the base camp.	- the risk of felling trees; -the risk of disturbance of wildlife habitats.
Method of ore extraction	The extraction will be mechanical in the open pit (no use of explosives).	Excavation holes.
Ore Processing	- the ore will be treated by gravimetry without the use of chemicals; - the absence of risks of chemical pollution linked to the processing of the ore.	Nothing to report
Access to the sites	- the maintenance of existing runways; - periodic maintenance of the runways; - the improvement of traffic conditions.	- the risk of felling trees around the runways during maintenance work; - the risk of soil degradation at lateritic borrowing sites.
Waste rock deposits	- the stored materials will be reused for the closure of the mine; -The deposits will form a protective strip around the excavated areas (in addition to the mesh fence, the deposits will reinforce the security of the site).	- the modification of the topography of the land; - the risk of erosion of the walls during the winter.
Mud basin water	- the discharge into nature of water not contaminated by chemicals; - the creation of wetlands favourable to the restoration of the natural environment (installation of vegetation and reappearance of fauna).	The risk of erosion.

2. Option without project:

Without the Massala small mine project, the company will certainly not contribute to the degradation of the environment in the area, but nevertheless the risks of extension of gold panning activities will be high within the operating permit. Several places on the permit are already occupied by gold miners.

Authorizing the exploitation of the small mine of Massala means allowing the extraction of the ore under the conditions required by the legislation and regulations in force.

3. Conclusion:

Mitigation and/or compensation for the drawbacks of the project can be achieved through appropriate measures that are detailed in the Environmental and Social Management Plan (ESMP).

VI. Analysis of the potential impacts of the project

This chapter deals in detail with the potential impacts of the project on the components of the environment. The identification and assessment of the importance of the impacts are the main axes developed.

1. Identification of sources of impact:
Potential sources of impact are all of the activities planned under the project that may bring about a change in the environment during the installation, operation and closure phases of the small mine.

During the installation phase, the sources of impact will come from the following elements:
- the rehabilitation of access roads;
- the delivery of equipment;
- clearing and cleaning the right-of-way of the activity sites (quarry, factory and base camp);
- excavations and earthworks on the ground;
- the installation of various equipment;
- the construction of infrastructure and buildings;
- the presence of labour.

During the operation phase, the sources of impact will come from the following elements:
- ore extraction;
- the transport of ore from the quarry to the factory;
- the energy source used (generators);
- waste produced on the site;
- waste rock deposits;
- water discharged from the mud basin;
- the presence of labour;
- periodic maintenance work on access roads.

During the closure phase, the sources of impact will come from the following elements:
- the dismantling of equipment and various infrastructures;
- the cleaning of sites and the evacuation of waste, especially special waste;
- the levelling of surfaces and the spreading of deposited materials;
- the equipment of water sources (boreholes) for the benefit of the surrounding populations;
- the presence of labour.

2. Identification of the components of the receiving environment:
The components of the environment likely to be affected by the project correspond to the sensitive elements of the study area, i.e. those that may be modified to a greater or lesser extent by the activities related to the project:

- the biophysical environment (flora, fauna, landscape, relief, ambient air, soil, water);
- the human/socio-economic environment (health, safety, noise pollution, employment/labour, road traffic, income-generating activities).

3. Assessment of the significance of the impacts:
The methodology for assessing the significance of the impacts is that of Hydro Québec. It is a matrix crossover of the intensity of the impact to its range (extent) and duration. We therefore have:

Impact Magnitude = Intensity x Range x Duration.

The approach consists of implementing the following three steps:

Step 1 : Assess the intensity of the disturbance imposed on each component and determine the duration and extent of the impacts generated by each activity.

Step 2 : Use the estimation network to determine the significance of each impact.

Step 3 : Record the results of the analysis in the impact assessment summary grid and determine the components affected or not by the project, as well as the magnitude of the cumulative impacts as well as those where uncertainty persists as to their nature and significance.

For each of the parameters (Intensity, Range, Duration) an analysis is made beforehand:

Analysis of the intensity and degree of disturbance of the environment related to impacts: the intensity of the change generated by a source of impact is either strong, medium or low, depending on the degree of modification of the element of the social or environmental environment studied; it will respect the following classification:

- *Strong or highly disturbing* (***Fo***) impacts: If these cause a profound alteration of a component of the environment, they can involve the entire environmental component affected or altered and its use in a significant way.
- *Medium or Medium Disturbance* (***Mo***) Impacts: If these result in a moderate alteration of an environmental component, i.e., if they somewhat reduce the use and quality of the environmental component.
- *Low or Low Disturbance (**Mo)*** Impacts: If these do not result in changes in the quality of a component of the environment and are not of significant concern.

Analysis of the geographic scope or extent of impacts: This indicator measures an area or proportion of the population. It corresponds to the spatial radiation of the change or the number of individuals likely to perceive this change in the study area; Particular attention should be paid to the geographic scope of the predicted impacts, determining, where appropriate, the following levels of scale:

- *Impacts with a regional scope* (***Re***): if the impacts will be felt at the level of the different regions crossed by the project, the affected element is used or the effects of the change on it can be perceived by the entire human or animal population of the main study area;
- *Impacts at local extent* (***Lo***): if the impact will be felt by a limited population in the project area, the affected element is used or the effects of the change on it may be perceived by the human or animal population located in the area circumscribed by the work area or in the immediate adjacent space;
- *Point-extent impacts* (***Po***): if the impact will be felt by a small group of individuals, the affected element is used, or the effects of the change on it may be perceived by a portion of the human or animal population located in the area circumscribed by the work area.

Duration analysis : this consists of analysing the period during which the impact will be felt on the components of the environment, distinguishing:

- *Long-term impacts* (***Lg***): impacts whose effect will be felt continuously and for the life of the project and even beyond;
- *Medium-term (**MB***) impacts: impacts whose effect will be felt continuously, but for a shorter period of time than the duration of the project;

- *Short-term impacts* (***Co***): impacts whose effect will be felt at a given time during a specific activity.

The assessment of the importance of the impact is made by combining the different indicators (Intensity, Scope, Duration) defined above, taking into account the network of significance of the impacts. The correlation established between each of the indicators makes it possible to establish the following classification:

- **Major Impact** (**Ma**): A major impact means that the integrity of an element's nature and its use are significantly altered; the impact endangers the life of a human, animal or plant species.
- **Medium impact** (**Mo**): A medium impact means that the integrity of a feature's nature and its use are partially altered; the impact does not endanger the lives of individuals or the survival of an animal or plant species.
- **Minor Impact** (**Mi**): A minor impact means that the integrity of an element's nature and its use are slightly altered.
- **Negligible Impact** (**Ne**): An impact of negligible significance means that the integrity of an element's nature and its use are spared.

Table 20. Impact Significance Network

Intensity	Scope/duration	Duration	Importance
Fo	Lo	Lg	My
		MB	MB
		Co	MB
	Re	Lg	MB
		MB	MB
		Co	Mi
	Po	Lg	MB
		MB	Mi
		Co	Mi
MB	Lo	Lg	MB
		MB	Mi
		Co	Mi
	Re	Lg	Mi
		MB	Mi
		Co	Mi
	Po	Lg	Mi
		MB	Mi
		Co	Not
Fa	Lo	Lg	Mi
		MB	Not
		Co	Not
	Re	Lg	Not
		MB	Not
		Co	Not
	Po	Lg	Not
		MB	Not
		Co	Not

The presentation of the importance of the impacts is done with the help of a synthesis matrix. This matrix presents each of the impacts, specifying its intensity, scope and duration to arrive at its importance.

The following tables show the interactions of project activities with the components of the receiving environment.

Table 21. Positive interactions between project activities and components of the receiving environment

Activities/sources of positive impacts	Components of the environment										
	Human/Socioeconomic				Biophysics						
	Improvement of the quality of life of the population	Health and safety of the population	Economic activities	Community Development	Vegetation	Fauna	Landscape/relief	Ambient air	Ground	Surface water	Groundwater
Job Opportunities	■		■								
Remittance of taxes			■	■							
Labor requirements during site preparation work			■								
Labor requirements during mine closure work			■								
Need for subcontracting			■								
Site Cleanup							■		■	■	■
Waste disposal							■		■	■	■
Equipment of water boreholes for the benefit of the surrounding populations	■	■		■							

Table 22. Negative interactions between project activities and components of the receiving environment

Activities/sources of negative impacts	Components of the environment												
	Biophysics							Human/Socioeconomic					
	Flora	Fauna	Landscape/Relief	Ambient air	Ground	Surface water	Groundwater	Health and safety of the population	Staff Health and Safety	Noise	Employment/Workforce	Road traffic	Economic activities
Clearing brush and cleaning of rights-of-way	■	■	■		■					■			
Excavations and earthworks			■	■	■				■	■			
Equipment installation			■						■	■			
Infrastructure and building construction			■		■				■	■			
Ore extraction			■	■	■		■		■	■			
Ore Transportation					■			■	■	■		■	
Generator set operation				■				■	■	■			
Waste generation			■		■	■	■	■	■				
Waste rock deposits			■		■								
Water discharged from the mud pond						■							
Dismantling of equipment and infrastructure								■	■	■			

Activities/sources of negative impacts	Components of the environment												
	Biophysics							Human/Socioeconomic					
	Flora	Fauna	Landscape/Relief	Ambient air	Ground	Surface water	Groundwater	Health and safety of the population	Staff Health and Safety	Noise	Employment/Workforce	Road traffic	Economic activities
Surface leveling													
Spreading of deposited materials													
On-site staff presence													
Land clearing (tree cutting)													

4. Analysis of the project's positive impacts:

4.1. Positive impacts on the components of the human socio-economic environment during the installation, operation and closure phases:

4.1.1. Job Opportunities:

The different phases of the project will require a need for staff. It is a job opportunity for local companies and young people from the locality. The project will create direct and indirect jobs. These jobs will be filled as far as possible by the local workforce.

The operation of the small-scale mine will have a positive socio-economic impact at both the local and regional levels. The impact will have a medium intensity (**Mo**), a regional extent (**Re**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

4.1.2. Payment of taxes and miscellaneous charges:

In accordance with the provisions of the mining code, during the operation phase, the company will pay taxes to the State which will then be invested in community development activities. These taxes will certainly play an important role in improving the quality of life of the population. Also within the framework of the project, equipment will be imported, which will result in the payment of customs duties and import taxes which will be sources of financial entry for the country. The impact will have a high intensity (**Fo**), a regional extent (**Re**) and a long duration (**Lg**). ***The importance of the impact is major (Ma).***

4.1.3. Business opportunity for local businesses:

Local companies could benefit from contracts in terms of supply of construction materials and various equipment as well as operations on site. All these opportunities will allow local entrepreneurs to achieve turnover. The impact will have a high intensity (**Fo**), a local extent (**Lo**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

4.1.4. Drinking water for the population:

When the mine closes, the site's boreholes will be equipped for the benefit of the population. This hydraulic equipment will certainly contribute to providing the population with sources of drinking water. The impact will have a high intensity (**Fo**), a local extent (**Lo**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

4.2. Positive impacts on the components of the biophysical environment in the closure phase:

4.2.1. Site Cleanup:

During the closure phase, the dismantling of the equipment followed by the general cleaning of the site will minimize the risks of soil and water pollution (surface and groundwater). These operations will also make it possible to be part of a landscape restoration dynamic. The impact will have a high intensity (**Fo**), a regional extent (**Re**) and a long duration (**Lg**). ***The importance of the impact is major (Ma).***

4.2.2. Waste disposal and/or recycling:

This measure will significantly mitigate the risks of residual impacts that may persist on the site after the mine closes. Impacts can affect components such as soil, surface and groundwater in terms of pollution or disturbance. The impact will have a high intensity (**Fo**), a regional extent (**Re**) and a long duration (**Lg**). ***The importance of the impact is major (Ma).***

Table 23. Matrix for presenting the importance of the project's positive impacts

Project Phase	Activities/Sources of Impacts	Components of the environment affected	Nature of the potential impact	Intensity			Scope			Duration			Importance			
				Fa	MB	Fo	Po	Lo	Re	Co	MB	Lg	Not	Mi	MB	My
Installation	Recruitment of labour for the needs of the site preparation work		Job Opportunities													
	Supplies of building materials and miscellaneous equipment		Business opportunities for local companies													
	Importing equipment		Payment of import taxes													
Exploitation	Staff Recruitment		Job Opportunities													
	Investments in community development activities	**Human/Socioeconomic**	Payment of taxes to the State													
	Subcontracting and maintenance work		Business opportunities for local companies													
	Recruitment of labour for the needs of the mine closure work		Job Opportunities													
Closure	Subcontracting work		Business opportunities for local companies													
	Equipped boreholes		Availability of drinking water for the surrounding populations.													
	Site Cleanup		Reduced risk of pollution of soil, surface water and groundwater; Restoration of the landscape.													
	Waste disposal and/or recycling	**Biophysics**	Reduced risk of residual pollution. Preservation of soil, surface and groundwater													

5. Analysis of the negative impacts of the project:

5.1. Negative impacts on the components of the human socio-economic environment during the installation phase:

5.1.1. Health and safety of the population:

The project's installation work, from brush clearing to infrastructure construction, including excavations and land earthworks, may have controllable negative impacts on the health and safety of the personnel mobilized on the site. These impacts will certainly manifest themselves in the flight of dust and the risk of work accidents that may occur. A priori, the impact will have a Low intensity (**Fa*),*** a point extent (**Po**) and a short duration (**Co**). ***The significance of the impact is negligible (Ne).***

5.1.2. Soundscape:

The noise of the machinery involved in the execution of the installation work can be a source of noise pollution for the personnel on the site. In this phase, the noise intensity should not reach 30 decibels (dB), which is still bearable for one person. The impact will have a medium intensity (**Mo*),*** a local extent (**Lo**) and an average duration (**Mo**). ***The magnitude of the impact is minor (Mi).***

5.1.3. Sites of cultural/archaeological interest:

No cultural sites were identified at the various sites of project activity during the field investigations. The communities did not report any sacred sites within the project's target perimeters. However, excavation and earthworks can uncover possible archaeological objects. With the application of the procedures for the protection of ancient objects, the negative impact will have a low intensity (**Fa**), a local extent (**Lo**) and a short duration (**Co**). ***The significance of the impact is negligible (Ne).***

5.2. Negative impacts on the components of the human socio-economic environment during the exploitation phase:

5.2.1. Health and safety of staff:

During ore extraction, personnel would be exposed to dust, the risk of occupational accidents and noise pollution. Given the significant scale of the activities at the quarry level, the negative impact will have a high intensity (**Fo**), a local extent (**Lo**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

The noise emitted by generators is a source of noise pollution for personnel, with an intensity between 30 and 80 dB, the impact will have a strong intensity (**Fo**), a local extent (**Lo**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

The production of waste (solid and liquid) on the various sites can be a source of contamination or the spread of diseases for the mobilized personnel. With the implementation of a waste management system, the negative impact will have a medium intensity (**Mo**), a local extent (**Lo**) and a long duration (**Lg**). ***The magnitude of the impact is minor (Mi).***

5.2.2. Health and safety of the population:

The transport of the ore from the quarry to the plant will generate a number of impacts related to the flight of dust on the access road, causing respiratory discomfort for users and the risk of road traffic accidents. The installation of road signs and other safety devices (e.g., the presence of flag doors) will minimize the risk of accidents. In addition, watering the slopes will help reduce the flight

of dust. The negative impact will have a medium intensity (**Mo**), a local extent (**Lo**) and a long duration (**Lg**). ***The magnitude of the impact is minor (Mi).***

The promiscuity caused by mixing between people from elsewhere and local populations can be a source of the spread of diseases such as sexually transmitted infections (STIs) and HIV-AIDS. The awareness-raising and other means of prevention planned as part of the project will reduce the risk of disease spread. The negative impact will have a Low intensity (**Fa*),*** a regional extent (**Re**) and a long duration (**Lg**). ***The magnitude of the impact is minor (Mi).***

5.3. Negative impacts on the components of the human socio-economic environment in the closure phase:

5.3.1. Health and safety of staff:

Activities during the closure phase (dismantling equipment, levelling surfaces and spreading materials) can cause dust to fly into the work area and the risk of workplace accidents. The negative impact will have a strong intensity (**Fo**), a local extent (**Lo**) and a short duration (**Co**). ***The magnitude of the impact is minor (Mi).***

5.3.2. Soundscape:

The mine's closure activities will certainly produce low-intensity noise pollution that will not have a significant impact on the personnel mobilized on the site. The impact will have a low intensity (**Fa**), a local extent (**Lo**) and a short duration (**Co**). ***The significance of the impact is negligible (Ne).***

5.4. Negative impacts on the components of the biophysical environment during the installation phase:

5.4.1. Flora:

The sites of the project's activities are covered by relatively abundant vegetation. Thus, trees could be destroyed during land clearing, which would contribute to a direct loss of certain plant species, including the destruction of plant habitats in the area.

The negative impact will have a high intensity (**Fo**), a regional extent (**Re**) and a long duration (**Lg**). ***The importance of the impact is major (Ma).***

5.4.2. Fauna:

Because of the noise emitted, the presence of humans, the destruction of habitats by the machines working on the sites, some animal species could migrate, which will thus cause the loss of wildlife species in the area concerned. Due to the observed scarcity of wildlife, the negative impact will have a Medium intensity (**Mo**), a regional extent (**Re**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

5.4.3. Landscape:

The impacts generated by the installation of equipment and infrastructure on the landscape will mainly concern changes in the characteristics of the local landscape by their size, shape, the contrast of the buildings with the surrounding environment and their layout. The negative impact will have a Medium intensity (**Mo**), a regional extent (**Re**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

5.4.4. Ambient air:

Dust emissions into the atmosphere could occur during installation work at the various sites. These emissions will be the main source of air pollution during this phase. However, the flight of dust

remains very limited in space and time. The negative impact will have a low intensity (**Fa**), a local extent (**Lo**) and a short duration (**Co**). ***The significance of the impact is negligible (Ne).***

5.4.5. Ground:

During the installation work on the sites, the soil will be uncovered and reworked, which would cause the disturbance of the natural rainwater drainage system; the weakening of the soil will increase the risk of erosion; the soil will thus be exposed to the phenomenon of leaching. Given the amount of rainfall in the project area, the negative impact will have a Medium intensity (**Mo**), a local extent (**Lo**) and a medium duration (**Mo**). ***The magnitude of the impact is minor (Mi).***

5.4.6. Surface waters:

To a lesser extent, the surrounding watercourses could be impacted by construction waste (solid and liquid) because of the distance separating the business areas from the water bodies.
The following elements that can be the cause of watercourse pollution during this installation phase are:

- hydrocarbons such as oils and fuels from machinery;
- the risks of pollution of the natural environment due to the discharge of waste from the site, especially at the level of water passages.

The risks of deterioration in surface water quality could occur especially in winter. The negative impact will have a Medium intensity (**Mo**), a regional extent (**Re**) and a medium duration (**Mo**). ***The magnitude of the impact is minor (Mi).***

5.4.7. Groundwater:

During this phase, the liquid wastes likely to pollute the groundwater by infiltration are engine oils and fuels following accidental spills on the surface of the ground. Given the average depth of the water table in the area during the winter period of 3 m, the negative impact will have an Medium intensity (**Mo**), a regional extent (**Re**) and an average duration (**Mo**). ***The magnitude of the impact is minor (Mi).***

5.5. Negative impacts on the components of the biophysical environment during the operation phase:

5.5.1. Landscape:

The impact of quarrying on the landscape will focus on changes in local relief features through waste rock deposits and excavations. Given the area occupied by the quarry and the plant, the negative impact will have a high intensity (**Fo**), a regional extent (**Re**) and a long duration (**Lg**). ***The importance of the impact is major (Ma).***

5.5.2. Ambient air:

The deterioration in ambient air quality would certainly come from the flight of dust at the quarry, the factory, the access roads and the emission of $_{CO2}$ from the construction machinery and other machinery. Due to the size of the operation, the negative impact will have a medium intensity (**Mo**), a regional extent (**Re**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

5.5.3. Ground:

The main sources of pollution risks could be linked to accidental spills of engine oils and fuels at: hydrocarbon storage platforms, hangars housing generators, access roads and equipment parking areas. In addition, the waste generated by the activities on the different sites could also contribute to soil degradation.
The main waste that could be generated is:

- domestic waste (paper, cardboard, plastic packaging, food waste, etc.);

- special waste (waste oil, fuel, oil filters, batteries, used tyres, etc.);
- biomedical waste (syringes, injection points, compresses, bottles of pharmaceutical products, etc.);
- various materials (scrap metal, glass, concrete, etc.)

Given the hazardous nature of some waste, the negative impact will have a high intensity (**Fo**), a local extent (**Lo**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

5.5.4. Surface waters:

During the operation of the sites, especially in winter, runoff water could carry pollutants (e.g., engine oils, fuel) to the nearest water passages, which will cause pollution risks. With the implementation of management systems for mainly liquid waste and due to the distance from the main rivers, the negative impact will have a medium intensity (**Mo**), a regional extent (**Re**) and an average duration (**Mo**). ***The magnitude of the impact is minor (Mi).***

5.5.5. Groundwater:

Through infiltration, liquid pollutants can contaminate groundwater, especially during the winter, when groundwater levels rise. The liquid waste management system planned for the various activity sites will significantly minimize the risk of infiltration into the subsoil. The negative impact will have a medium intensity (**Mo**), a regional extent (**Re**) and a medium duration (**Mo**). ***The magnitude of the impact is minor (Mi).***

5.6. Negative impacts on the components of the biophysical environment in the closure phase:

5.6.1. Ambient air:

The work of levelling the surfaces and spreading the materials deposited can cause the dust to fly away on the sites concerned. The emission of dust will be a source of respiratory discomfort for the mobilized personnel. With the planned protection devices and watering, the negative impact will have a low intensity (**Fa**), a local extent (**Lo**) and a short duration (**Co**). ***The significance of the impact is negligible (Ne).***

5.6.2. Surface waters:

During this phase, if the materials from the dismantling of the infrastructure and the waste are not completely evacuated, there may be some risk of pollution of runoff water. Materials and waste could be washed away by rainwater. Given the provisions of the mine closure plan, the negative impact will have a low intensity (**Fa**), a local extent (**Lo**) and a short duration (**Co**). ***The significance of the impact is negligible (Ne).***

5.6.3. Groundwater:

Impacts on groundwater could occur in the event that there is still residual liquid waste on the site. By infiltration, this waste can be a source of groundwater pollution, but with the site decontamination protocols provided for in the mine closure plan, the negative impact will have a low intensity (**Fa**), a local extent (**Lo**) and a short duration (**Co**). ***The significance of the impact is negligible (Ne).***

Table 24. Matrix for presenting the significance of the project's negative impacts

Project Phase	Activities/Sources of Impacts	Components of the environment affected	Nature of the potential impact	Intensity			Scope			Duration			Importance			
				Fa	MB	Fo	Po	Lo	Re	Co	MB	Lg	Not	Mi	MB	My
Installation	Clearing brush and cleaning of rights-of-way	Health	Risks of respiratory discomfort due to the flight of dust													
		Security	-Risks of traffic accidents -Risks of work accidents													
		Landscape	Risks of changes in landscape appearance													
		Ambient air	Risks of air pollution by dust in particular													
		Soundscape	Risks of noise pollution (noise)													
		Flora	Risks of destruction of vegetation cover													
		Fauna	-Risks of disturbance of natural habitats; -Risks of wildlife migration.													
	Excavations and earthworks	Ground	Risks of soil embrittlement													
		Sites of cultural/archaeological interest	Risks of discovery of ancient objects.													
	Infrastructure and building construction	Landscape	Risks of changes in landscape appearance													
		Security	Risks of occupational accidents													
		Soundscape	Risks of noise pollution (noise)													
		Surface water	Risks of pollution of runoff water													

Project Phase	Activities/Sources of Impacts	Components of the environment affected	Nature of the potential impact	Intensity		Scope			Duration			Importance			
				Fa	MB	Fo	Po	Lo	Re	Co	MB	Lg	Not	Mi	MB	My
Exploitation		Groundwater	Risks of pollution of the water table by infiltration													
	Presence of the workforce	Health	Risks of the spread of STIs and HIV-AIDS.													
	Ore extraction	Landscape	Risks of local relief modification													
		Ground	-Risks of soil weakening; -Erosion risks.													
		Ambient air	Risks of air pollution by dust and CO2													
	Ore Transportation	Security	Risks of road traffic accidents.													
	Generator set operation	Ambient air	Risks of CO2 air pollution													
		Health	Risk of respiratory discomfort due to CO2 suspended in the air													
		Security	Risks of occupational accidents													
		Soundscape	Risks of noise pollution (noise)													
	Waste generation	Landscape	Risks of unsanitary conditions on the sites													
		Ground	Soil pollution risks													
		Surface water	Risks of pollution of runoff water													
		Groundwater	Risks of groundwater pollution by infiltration of liquid waste.													
		Health	Risks of deterioration of hygiene conditions													
		Security	Fire Hazards													

SERM SA

Project Phase	Activities/Sources of Impacts	Components of the environment affected	Nature of the potential impact	Intensity		Scope			Duration			Importance			
				Fa	MB	Fo	Po	Lo	Re	Co	MB	Lg	Not	Mi	MB	My
Closure	Disposal of waste rock	Ground	Risks of material collapse													
	Drainage of water from the mud basin	Surface water	Muddy water runoff hazards													
	Dismantling of equipment and infrastructure	Health	Hazards of Hazardous Waste Contamination													
		Security	Risks of occupational accidents													
		Soundscape	Risks of noise pollution (noise)													
	Surface leveling	Health	Risk of respiratory discomfort due to dust													
		Security	Risks of occupational accidents													
		Soundscape	Risks of noise pollution (noise)													
	Spreading of deposited materials	Health	Risk of respiratory discomfort due to dust													
		Security	Risks of occupational accidents													
		Soundscape	Risks of noise pollution (noise)													
	Presence of the workforce	Health	Risks of spreading STIs and HIV/AIDS													

6. Analysis of the project's positive cumulative impacts:

6.1. Positive cumulative impacts on human/socio-economic components during all phases:

6.1.1. Job Opportunities:

The employment opportunities created as part of the Massala small-scale mine project will certainly be added to those that already exist in the area. The positive cumulative impact will have a medium intensity (**Mo**), a regional extent (**Re**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

6.1.2. Payment of taxes and miscellaneous charges:

The taxes paid by the company will only increase the financial inflows for the country because other companies established in the area are subject to the same rules. This will give more resources to the State to invest in community development projects. The positive cumulative impact will have a medium intensity (**Mo**), a regional extent (**Re**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

6.1.3. Business opportunities for local companies:

The proliferation of mining companies in the area offers many opportunities to local companies in terms of turnover. SERM SA will certainly collaborate with the same local companies that have already performed services for other companies operating in the area. The positive cumulative impact will have a medium intensity (**Mo**), a regional extent (**Re**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

7. Analysis of the cumulative negative impacts of the project:

7.1. Cumulative negative impacts on human/socio-economic components:

7.1.1. Health of local populations:

The increase in the number of people from elsewhere could increase the risk of the spread of sexually transmitted infections and HIV-AIDS in the area. As a reminder, this project will mobilize about 53 people spread over the different sites (quarry, factory and remote site). The cumulative negative impact will have a strong intensity (**Fo**), a local extent (**Lo**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

7.1.2. Safety of local populations:

With this project, there will be more traffic on the access roads. Trucks and other liaison vehicles will use the same tracks as the machines of other companies and local populations. The increase in traffic could lead to the risk of road traffic accidents. The cumulative negative impact will have a strong intensity (**Fo**), a local extent (**Lo**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

7.2. Cumulative negative impacts on components of the biophysical environment:

7.2.1. Flora/fauna

Brush clearing on the site could contribute to the loss of plant species in the area and the disturbance of wildlife habitats, leading to the prolonged migration of wildlife to other regions. Because the project area has become a quintessential place where several mining companies have developed their projects, the number of areas deforested has increased over the years. The

cumulative negative impact will have a medium intensity (**Mo**), a regional extent (**Re**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

7.2.2. Ambient air:

The project will certainly contribute to the accumulation of atmospheric pollutants suspended in the air through the emission of CO2 released by machines. The quality of the ambient air could be impacted by suspended particles. Due to the use of other machines in the area, the negative cumulative impact will have a high intensity (**Fo**), a local extent (**Lo**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

7.2.3. Climate:

The accumulation of CO2 emissions is also a factor in global warming. Given the presence of several sources of carbon dioxide emissions in the area, the cumulative impact will have a medium intensity (**Mo**), a regional extent (**Re**) and a long duration (**Lg**). ***The magnitude of the impact is medium (Mo).***

8. Analysis of the residual negative impacts of the project:

Given the application of the decontamination and clean-up protocol on the various sites, the risk of negative residual impacts on the components of the receiving environment is low. The magnitude of the impact is negligible, if any.

Table 25. Matrix for presenting the significance of the project's positive cumulative impacts

Project Phase	Activities/Sources of Impacts	Components of the environment affected	Nature of the potential impact	Intensity		Scope				Duration			Importance			
				Fa	MB	Fo	Po	Lo	Re	Co	MB	Lg	Not	Mi	MB	My
Installation, Operation and Closure	Recruitment of the workforce for the needs of the work.	Population employment and incomes	Job Opportunities													
	Supplies of building materials and miscellaneous equipment	Economic activities	Business opportunities for local companies													
	Subcontracting with local companies.	Economic activities														
	Importing equipment	State revenue	Payment of import taxes and miscellaneous charges													

Table 26. Matrix for Presenting the Significance of the Project's Cumulative Adverse Impacts

Project Phase	Activities/Sources of Impacts	Components of the environment affected	Nature of the potential impact	Intensity		Scope				Duration			Importance			
				Fa	MB	Fo	Po	Lo	Re	Co	MB	Lg	Not	Mi	MB	My
Installation, Operation and Closure	Clearing brush and cleaning of rights-of-way	Vegetation/Wildlife	Risks of destruction of vegetation cover and wildlife habitats.													
	Excavations, earthworks, extraction/transport of ore and spreading of materials	Ambient air	Risks of deterioration of ambient air quality by dust and CO2													
	CO2 emissions from machinery and various machines	Climate	Risks of contributing to the effects of climate change.													

VII. Proposed actions

This chapter presents the environmental and social measures relating to the project.
The proposed measures are actions that aim to eliminate, minimize, compensate and/or prevent negative impacts. They also aim to enhance a positive impact on an element of the environment. All these measures are intended to allow for a better integration of the project into the community.

Effective measures are proposed with reasonable costs to reduce the potential negative impacts of the project to acceptable levels.

The proposal of these measures takes into account the legislative and regulatory requirements for environmental protection in force in Mali. The opinions expressed by the local population, as well as those of the local authorities, were also considered. These measures will be implemented under the GGP.

The main measures proposed in the framework of the project are:

1. Mitigation measures:

They are used to eliminate the source of impact or reduce its intensity so that the impacts are socially and environmentally acceptable. However, it is recommended that a monitoring and monitoring program be implemented during the project phases to verify the effectiveness of these measures.

2. Compensation measures:

The aim is to compensate for the impacts of the project that cannot be mitigated (e.g., the destruction of vegetation).

3. Enhancement measures:

These measures are used to improve existing social or environmental conditions that are not directly impacted by the project. Such measures may be implemented outside the work area.

4. Sanitary measures:

These measures are used to prevent the outbreak of diseases in the area and to preserve the health of the personnel mobilized in the field and the population.

5. Security measures:

These measures are used to prevent accidents and preserve the safety of personnel mobilized in the field and the population.

6. Impact mitigation measures during the installation phase:

6.1. Mitigating impacts on flora

To minimize vegetation destruction, the following measures should be taken:

- strictly use the open spaces for the project;
- avoid felling trees as much as possible;
- raise awareness among staff.

6.2. Mitigating impacts on wildlife

To minimize wildlife habitat disturbance and wildlife loss, the following measures should be taken:

- limit brush clearing to the perimeter where infrastructure and equipment are installed;

- avoid crushing wildlife by the machines as much as possible;
- reduce noise pollution as much as possible;
- prohibit the hunting of game by personnel.

6.3. Mitigation of impacts on the landscape

To reduce the visual impact on the landscape, it is important to maintain the natural vegetation screens around the construction site.

6.4. Mitigating impacts on ambient air

To reduce dust emissions, work areas must be humidified and access roads watered.
Respecting the watering frequency will effectively reduce the amount of dust emitted into the atmosphere.

The fuels used by machinery and vehicles must be of quality that meets the relevant standards to reduce the emission of pollutants (e.g. CO2) into the atmosphere. In addition, the machines should be regularly maintained and the speed limit should be reduced to 20km/h for vehicles and machines in dry periods.

6.5. Mitigation of impacts on the ground

The space dedicated to excavation and earthworks must be optimised and the holes must be closed.
For accidental oil spills, the required protocols must be applied (e.g., refuelling equipment and vehicles only by a distribution pump).

6.6. Mitigation of impacts on the noise environment

To minimize noise pollution, the following measures will be required:

- the use of equipment equipped with noise limitation systems;
- the prohibition of noisy work at night;
- regular maintenance of motorized vehicles.

6.7. Mitigating impacts on water

To avoid the risk of water pollution from accidental oil spills:

- the tanks must be equipped with retention basins with the presence of sandboxes;
- Refuelling must be done using a distribution pump.

To minimize the risk of water pollution by other types of waste, the following will be put in place:

- a waste collection and disposal system;
- equipped platforms;
- garbage cans installed.

6.8. Mitigating impacts on staff health

The installation work of the small mine must be carried out in acceptable sanitary and hygienic conditions. The proposed mitigation measures are as follows:

- the provision of dust masks to staff;
- the installation and regular maintenance of construction toilets;
- the supply of pharmacy boxes;
- the provision of drinking water to staff;
- waste management;
- raising awareness of the risks of the spread of STIs and HIV-AIDS;
- the organization of quarter-hour sessions on health risks.

6.9. Mitigating impacts on personnel safety

To minimize the risk of workplace accidents and avoid injuries as much as possible, occupational safety instructions must be followed. The following arrangements must be put in place for the attention of staff:

- the provision of and compliance with the mandatory wearing of Personal Protective Equipment (PPE);
- the posting of safety instructions on the site;
- the prohibition of the use of narcotics (alcohol, drugs, etc.);
- compliance with the internal regulations posted on the site;
- the organization of quarter-hour sessions on the risks of accidents.

6.10. Mitigating the health impacts of surrounding populations

To preserve the health of the surrounding populations, it is advisable to periodically organize awareness-raising sessions in the surrounding villages on the risks of the spread of STIs and HIV-AIDS.

6.11. Mitigating the impacts on the safety of the surrounding populations

To make users safe on the access tracks, the following instructions must be applied:

- install and respect road signs along the paths and more particularly at the crossings;
- install flag bearers at truck exits;
- limit speed;
- raise awareness among the company's drivers.

6.12. Mitigating the impacts on the income of the surrounding populations

To improve the income of the surrounding populations, it is necessary to create job opportunities through the recruitment of local staff on the site. In addition, it is necessary to ensure that the site is supplied with construction materials, various equipment and subcontracting services to local companies.

6.13. Mitigation of impacts on sites of cultural/archaeological interest

To preserve any ancient objects discovered within the scope of the project's activities, the following procedure will be applied:

- immediately stop work in the area concerned;
- inform the mine management;
- secure the perimeter;
- involve the competent service;
- work in the area should not resume until the competent department has given a favourable opinion.

7. Mitigation measures for impacts during the operation phase:

7.1. Mitigation of impacts on the landscape

To minimize the visual impact of the project in relation to the alteration of the local relief, waste rock should be placed close to the quarry in a manner that conserves the surrounding natural resources.

7.2. Mitigating impacts on ambient air

In order to reduce the deterioration of ambient air quality at the individual sites, the following measures are proposed:

For dust reduction:

- moistening areas of the operating quarry and truck traffic lanes;
- Moisten the spaces around the ore storage area to reduce dust flight during handling.

For the reduction of CO2 emissions:

- ensure regular maintenance of machinery (e.g. generators) in order to minimise CO_2 emissions;
- install a filter device on the machines;
- measure air quality using a hand-held measuring device.

7.3. Mitigation of impacts on the ground

The following actions should be taken to mitigate impacts on soil:

- stabilization of the surroundings of excavation holes to reduce the risk of water erosion;
- mechanical or biological fixation on the slopes of waste rock deposits to reduce the risk of landslides;
- the installation of anti-erosion devices (e.g. stone-paving) in vulnerable areas;
- the installation of watertight platforms for the storage of polluting materials (hydrocarbons, engine oils, greases, etc.);
- the installation of a hydrocarbon separator system in the vehicle washing and maintenance area.

7.4. Mitigation of impacts on the noise environment

Noise mitigation measures include:

- the mandatory wearing of headphones or earplugs for exposed personnel;
- soundproofing of noisy equipment (e.g. crushers, generators, etc.);
- the measurement of noise pollution by a sound level meter in order to comply with the required standards.

7.5. Mitigating impacts on surface water

In order to reduce the risk of pollution of watercourses, the following measures are proposed:

- respect the regulatory distances (500m) between the facilities and the watercourses;
- Implement a water quality monitoring program.

7.6. Mitigating impacts on groundwater

In order to reduce the risk of groundwater pollution, the following measures are proposed:

- put waterproofing in the mud basin;
- carry out physico-chemical and bacteriological analyses before the start of mine operations;
- set up a programme to monitor the quality of the water table (wells) in the surrounding villages;
- build septic tanks at the level of the living quarters for the treatment of domestic wastewater.

7.7. Mitigating health impacts

The following actions should be taken to mitigate health impacts:

7.7.1. For the staff mobilized on the site:

- maintaining sanitation on the site;
- the provision of drinking water;
- the provision of mosquito nets to the residents of the base camp;
- the availability of condoms for staff;
- the construction of toilets that comply with hygienic standards (respect for the person/toilet ratio);
- the installation of an infirmary and the provision of first aid;

- the organisation of weekly quarter-hour sessions on health risks;
- periodic medical check-ups of staff.

7.7.2. For the surrounding populations:
- raising awareness of health risks, including the risks of the spread of STIs and HIV-AIDS;
- the support of local health centers with basic necessities to facilitate, among other things: the management of respiratory diseases caused by dust, the management of cases of traffic accidents, etc.

7.7.3. Mitigating Safety Impacts:

To ensure safety and prevent possible accidents, the following actions should be taken:

7.7.4. For the safety of the staff:
- the provision of PPE;
- compliance with the mandatory wearing of PPE;
- the display of safety instructions;
- raising awareness of safety instructions;
- the prohibition of narcotics (alcohol, drugs, etc.) during working hours;
- the organisation of weekly quarter-hour sessions on the risks of work accidents.

7.7.5. For the safety of the surrounding populations:
- raising awareness of the risks of road traffic accidents;
- prohibition of entry into areas in operation (e.g., quarry, factory).

7.7.6. For road safety:
- the installation of signage along the access roads to the site;
- the installation of flag bearers in intersections;
- speed limit;
- headlights on;
- Driver awareness.

7.7.7. For fire safety:
- the installation of fire extinguishers;
- the development and implementation of an Internal Operation Plan (POI) in collaboration with the General Directorate of Civil Protection;
- training of personnel in first aid, handling, extinguishing, rescue and clearance;
- the provision of emergency means in risk areas: fire hydrants (PIs), armed fire hoses (HOSEs), etc.
- the annual organisation of simulation exercises with the Directorate General of Civil Protection;
- the scheduling of prevention visits by the Civil Protection.

7.7.8. For the safety of excavation holes:
- the installation of safety barriers around the holes;
- the parking of the guards around the quarry;
- the installation of signs prohibiting access to the area by unauthorized persons;
- Raising awareness among the surrounding population about the risks of falls.

7.8. Waste management:

For better waste management on all sites, the following actions should be carried out:

7.8.1. For ordinary household waste:

- the installation of bins for pre-collection;
- the development of a platform for the deposit and selective sorting of waste;
- the incineration of non-hazardous solid waste (paper, cardboard, wood scrap, etc.);
- the recruitment of maintenance workers to ensure the cleanliness of the site.

7.8.2. For hazardous waste:

- the storage of hazardous waste on sealed and fenced platforms;
- the collection and disposal of used oil by an approved company;
- recovery of oil filters, batteries and used tyres.

7.8.3. For organic waste:

- the production of compost from peelings and other organic matter;
- the amendment of the spaces dedicated to gardens at the level of the living quarters.

7.8.4. For biomedical waste:

- the installation of tricolour bins (red, yellow and black) for sorting waste from the infirmary;
- the evacuation of safety boxes containing injection needles to health centres;
- the evacuation of waste to be incinerated to health centres.

7.9. Management of job opportunities:

To contribute to the reduction of youth unemployment and improve their incomes, the following actions should be carried out:

- the recruitment of young people from the surrounding villages as a priority;
- the application of the law in terms of the recruitment of workers.

8. Mitigation measures during the closure phase:

8.1. Mitigating impacts on staff health

The following actions should be taken to mitigate health impacts:

- the wearing of dust masks;
- moistening surfaces during levelling and spreading of materials;
- the supply of pharmacy boxes.

8.2. Mitigating impacts on personnel safety

The following actions should be taken to mitigate safety impacts:

- the provision of PPE;
- compliance with the mandatory wearing of PPE;
- compliance with safety instructions.

9. Compensation measures:

The main compensation measure to be implemented in this project is compensatory reforestation. In addition to this measure, land clearing taxes will be paid to the Water and Forests Department in accordance with forestry legislation.

The compensatory reforestation program can be implemented gradually depending on the availability of sites to be reforested.

10. Enhancement measures:

The main improvement measures proposed in this report are as follows:

- Rehabilitation of village roads: given the advanced state of degradation of the roads linking the villages in the area, the road reprofiling work and the construction of crossing structures planned by the company will constitute beneficial actions for the population.
- the strengthening of medical care at the level of the health center in the area.
- the equipment of boreholes carried out at the level of the factory and the living quarters for the benefit of the populations after the closure of the mine. It was noted that the populations are confronted daily with the difficulties of supplying drinking water.

Table 27. Matrix for the synthesis of environmental protection measures

Project Phase	Activities/Sources of Impacts	Components of the environment affected	Nature of the potential impact	Mitigation, compensation and enhancement measures
Installation	Clearing brush and cleaning of rights-of-way	Health	-Risk of respiratory discomfort due to the flight of dust; -Risks of deterioration of hygiene conditions.	- Provide dust masks to staff; - Install and regularly maintain the construction toilets; - Provide pharmacy boxes; -Provide drinking water to staff.
		Security	-Risks of traffic accidents -Risks of work accidents	- Install and respect the road signs along the tracks and more particularly at the crossings; - Install flag bearers at truck exits; -Limit the speed; - Raise awareness among the company's drivers; -Provide PPE to staff; - Respect the mandatory wearing of PPE; - Post safety instructions on the site; - Prohibit the use of narcotics (alcohol, drugs, etc.); - Respect the internal rules posted on the site; - Organize quarter-hour sessions on the risk of accidents.
		Landscape	Risks of changes in landscape appearance	Maintain the natural vegetation screens around the site.
		Ambient air	Risks of air pollution by dust in particular	- Humidify the work areas and water the access roads; -Respect the watering frequency; - Comply with standards for reducing the emission of pollutants into the atmosphere; - Regularly maintain the machines; -Reduce the speed to 20km/h for vehicles in dry periods.
		Soundscape	Risks of noise pollution (noise)	- Use equipment equipped with noise limitation systems; - Prohibit noisy work at night; -Regularly maintain motorized vehicles.
		Flora	Risks of destruction of vegetation cover	-Strictly use the open spaces for the project; - Avoid felling trees as much as possible; - Raise awareness among staff; - Proceed with compensatory reforestation; - Pay the land clearing taxes.

Project Phase	Activities/Sources of Impacts	Components of the environment affected	Nature of the potential impact	Mitigation, compensation and enhancement measures
		Fauna	-Risks of disturbance of natural habitats; -Risks of wildlife migration.	- Limit brush clearing to the perimeter of the installation of infrastructure and equipment; - Avoid crushing wildlife by machines as much as possible; - Reduce noise pollution as much as possible; - Prohibit the hunting of game by staff.
	Excavations and earthworks	Ground	-Risks of soil weakening; -Risks of accidental oil spills on the ground.	- Optimize the space dedicated to excavation and earthworks; -Close the holes; - Apply the required protocols for remediation.
		Sites of cultural/archaeological interest	Risks of discovery of ancient objects.	- Immediately stop work in the area concerned; - Inform the mine management; - Secure the perimeter; - Involve the competent department; - Resume work in the area only after the favourable opinion of the competent department.
	Infrastructure and building construction	Landscape	Risks of changes in landscape appearance	Maintain the natural vegetation screens around the site.
		Security	Risks of occupational accidents	-Provide PPE to staff; - Respect the mandatory wearing of PPE; - Post safety instructions on the site; - Prohibit the use of narcotics (alcohol, drugs, etc.); - Respect the internal rules posted on the site; - Organize quarter-hour sessions on the risk of accidents.
			Fire Hazards	- Install fire extinguishers; - Develop and implement an Internal Operation Plan (POI) in collaboration with the General Directorate of Civil Protection; - Train staff in first aid, handling, extinguishing, rescue and clearance; - Have emergency means available in high-risk areas: fire hydrants (PIs), armed fire hoses (RIA), etc. - Organize annual simulation exercises with the General Directorate of Civil Protection; - Schedule prevention visits by the Civil Protection.
		Soundscape	Risks of noise pollution (noise)	- Use equipment equipped with noise limitation systems; - Prohibit noisy work at night; -Regularly maintain motorized vehicles.

Project Phase	Activities/Sources of Impacts	Components of the environment affected	Nature of the potential impact	Mitigation, compensation and enhancement measures
Exploitation		Surface water Groundwater	Risks of pollution of runoff water Risks of pollution of the water table by infiltration	- Put retention basins around the hydrocarbon tanks; - Also set up sandboxes; - Refuel the machines using a distribution pump; - Setting up a waste collection and evacuation system; - Setting up platforms for the storage of engine oils; -Install bins to facilitate the pre-collection of waste.
	Presence of the workforce	Health	Risks of the spread of STIs and HIV-AIDS.	- Raise awareness of the risks of spreading STIs and HIV-AIDS; - Organization of quarter-hour sessions on health risks.
	Staff Recruitment	Employment	Job Opportunities	- Promote the recruitment of nationals from the surrounding villages; - Enforce the law in terms of worker recruitment.
	Local development	Roads/tracks	Rehabilitation of village tracks	Reprofile the roadway and build crossing structures.
	Ore extraction	Landscape	Risks of local relief modification	- Deposit waste rock not exceeding 10 m in height; -Dispose of waste rock not far from the quarry in such a way as to preserve the surrounding natural resources.
		Ground	-Risks of soil weakening; -Erosion risks.	-Stabilize the surroundings of excavation holes to reduce the risk of water erosion; - Mechanically or biologically fix the waste rock deposits on the slopes to reduce the risk of landslides; - Install anti-erosion devices (e.g. stonework) in vulnerable areas; - Install watertight platforms for the storage of polluting materials (hydrocarbons, engine oils, greases, etc.); -Install a hydrocarbon separator system on the vehicle washing and maintenance area.
		Ambient air	Risks of air pollution by dust.	-Humidify the areas of the quarry in operation and the truck traffic lanes; -Humidify the spaces around the ore storage area to reduce dust flight during handling.
		Security	Fall hazards	- Prohibit people from entering areas in operation (e.g. quarry); -Install safety barriers around the holes; - Park guards around the quarry; - Install signs prohibiting access to the area;

Project Phase	Activities/Sources of Impacts	Components of the environment affected	Nature of the potential impact	Mitigation, compensation and enhancement measures
	Ore Transportation	Security	Risks of road traffic accidents.	- Raise awareness among the surrounding population about the risks of falls. - Install and respect the road signs along the tracks and more particularly at the crossings; - Install flag bearers at truck exits; -Limit the speed; - Require the headlights to be turned on; - Support local health centers with basic necessities to facilitate the management of traffic accidents; - Raise awareness among the company's drivers; - Raise awareness of the risks of road traffic accidents.
	Generator set operation	Ambient air	Risks of CO2 air pollution	- Ensure regular maintenance of machines (e.g. generators) in order to minimize CO2 emissions; - Install a filter device on the machines; -Measure air quality using a handheld measuring device.
		Health	Risk of respiratory discomfort due to CO2 suspended in the air	- Install an infirmary and provide first aid; - Organize weekly quarter-hour sessions on health risks; - Support local health centers with essential medicines to facilitate the management of respiratory diseases caused by dust; - Carry out periodic medical checks of staff.
		Security	Risks of occupational accidents	• Provide PPE to generator set maintenance personnel; - Require compliance with the mandatory wearing of PPE; -Display safety guidelines at the platform where the groups are installed.
		Soundscape	Risks of noise pollution (noise)	- Make it compulsory for exposed personnel to wear a helmet or earplug; - Soundproofing noisy equipment (e.g. crushers, generators, etc.); - Measure the noise pollution by a sound level meter in order to comply with the required standards.
	Waste generation	Landscape	Risks of unsanitary conditions on sites due to ordinary waste	- Install bins for pre-collection; - To set up a platform for the deposit and selective sorting of waste; - Incinerate non-hazardous solid waste (paper, cardboard, wood debris, etc.);

Project Phase	Activities/Sources of Impacts	Components of the environment affected	Nature of the potential impact	Mitigation, compensation and enhancement measures
		Ground	Soil pollution risks	- Recruit maintenance workers to ensure the cleanliness of the site. - Store hazardous waste on watertight and fenced platforms; - Collect and dispose of used oil by an approved company; -Collect oil filters, batteries and used tyres.
		Health	Risks of disease spread from biomedical waste	- Install tricolor bins (red, yellow and black) for sorting waste from the infirmary; - Evacuate the safety boxes containing the injection needles to the health centers; - Evacuate the waste to be incinerated to health centers.
		Surface water	Risks of pollution of runoff water	- Respect the regulatory distances (500m) between the facilities and the watercourses; - Implement a water quality monitoring program.
		Groundwater	Risks of groundwater pollution by infiltration of liquid waste.	- Sealing the mud basin; - Carry out physico-chemical and bacteriological analyses before the start of mine operation; - Establish a monitoring program for the quality of the water table (wells) in the surrounding villages; - Build septic tanks at the level of the living quarters for the treatment of domestic wastewater.
		Health	Risks of deterioration of hygiene conditions	-Maintain sanitation on the site; - Provide drinking water; - Provide mosquito nets to the residents of the living quarters; -Build toilets that comply with hygienic standards (respect for the person/toilet ratio); - Organize weekly quarter-hour sessions on health risks.
		Security	Fire Hazards	- Install fire extinguishers; - Develop and implement an Internal Operation Plan (POI) in collaboration with the General Directorate of Civil Protection; - Train staff in first aid, handling, extinguishing, rescue and clearance; - Have emergency means available in high-risk areas: fire hydrants (PIs), armed fire hoses (RIA), etc.

Project Phase	Activities/Sources of Impacts	Components of the environment affected	Nature of the potential impact	Mitigation, compensation and enhancement measures
				- Organize annual simulation exercises with the General Directorate of Civil Protection; - Schedule prevention visits by the Civil Protection.
	Disposal of waste rock	Ground	Risks of material collapse	- Mechanically or biologically fix the waste rock deposits on the slopes to reduce the risk of landslides; - Install anti-erosion devices (e.g. stonework) in vulnerable areas.
	Drainage of water from the mud basin	Surface water	Muddy water runoff hazards	- Respect the regulatory distances (500m) between the facilities and the watercourses; -Regularly check the settling device at the level of the sludge basin.
	Presence of the workforce	Health	-Risks of spreading STIs and HIV-AIDS; -Risks of consumption of prohibited products.	- Raise awareness of health risks, in particular the risks of the spread of STIs and HIV-AIDS; - Distribute condoms for staff; - Prohibit the use of narcotics (alcohol, drugs, etc.) during working hours.
	Staff Recruitment	Employment	Job Opportunities	- Promote the recruitment of nationals from the surrounding villages; - Enforce the law in terms of worker recruitment.
	Local development	Health	Improving the quality of care	Support health centres in the area by providing them with essential medicines.
	Dismantling of equipment and infrastructure	Health	Hazards of Hazardous Waste Contamination	- Store hazardous waste on watertight and fenced platforms; - Collect and dispose of used oil by an approved company; -Collect oil filters, batteries and used tyres.
		Security	Risks of occupational accidents	-Provide PPE to the dismantling team; - Require compliance with the mandatory wearing of PPE; - Raise awareness of safety instructions; - Ban narcotics (alcohol, drugs, etc.) during working hours.
		Soundscape	Risks of noise pollution (noise)	- Make it compulsory for exposed personnel to wear a helmet or earplug; - Soundproofing noisy equipment (e.g. crushers, generators, etc.); - Measure the noise pollution by a sound level meter in order to comply with the required standards.
Closure	Surface leveling	Health	Risk of respiratory discomfort due to dust	- Require the wearing of dust masks; -Moisten surfaces during leveling and spreading of materials.

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Project Phase	Activities/Sources of Impacts	Components of the environment affected	Nature of the potential impact	Mitigation, compensation and enhancement measures
		Security	Risks of occupational accidents	-Provide PPE to staff; - Require compliance with the mandatory wearing of PPE; -Require compliance with safety instructions.
		Soundscape	Risks of noise pollution (noise)	- Make it compulsory for exposed personnel to wear a helmet or earplug; - Soundproofing noisy equipment (e.g. crushers, generators, etc.); - Measure the noise pollution by a sound level meter in order to comply with the required standards.
	Spreading of deposited materials	Health	Risk of respiratory discomfort due to dust	- Require the wearing of dust masks; -Moisten surfaces during leveling and spreading of materials.
		Security	Risks of occupational accidents	-Provide PPE to staff; - Require compliance with the mandatory wearing of PPE; -Require compliance with safety instructions.
	Presence of the workforce	Health	Risks of spreading STIs and HIV/AIDS	- Raise awareness of health risks, in particular the risks of the spread of STIs and HIV-AIDS; -Distribute condoms for staff.
	Local development	Drinking water	Drinking water supply	Equip the boreholes carried out on the sites for the benefit of the surrounding populations at the closure of the mine.

VIII. Emergency Management Plan

Emergencies related to on-site activities focus on the risks of fire, traffic accidents and oil spills. For the management of emergency situations, provisions for the prevention and correction of accidents are proposed. There are general measures and specific measures.

1. Risk Management:

1.1. General preventive measures

1.1.1. Alert

- Raise awareness among staff and guards of the alert procedures in force on the site;
- View a list of response teams and those responsible for coordinating the evacuation of the site.

1.1.2. Alarm

- install an alarm system on the site and carry out periodic tests (functionality and audibility);
- display a specific instruction in the machinery control room enclosure.

This will define the action to be taken:

- for the call for help;
- who to warn.

1.1.3. Emergency plan

Write an emergency plan to deal with any emergency and disaster situation:

- material or bodily accidents;
- Fires;
- oil spill;
- environmental pollution, etc.

This plan must be validated by the competent authorities and simulated periodically.

1.2. Special measures to prevent accidents associated with liquid storage tanks

1.2.1. Fire and explosion prevention

- design installations to prevent any spread of flaming water tables (pits, retention basins, siphons in water networks);
- handle away from any potential sources of ignition (open flame, sparks, electric arcs, etc.) and heat;
- intervene only when the tank is cold, degassed and aerated;
- loading and unloading tanks at room temperature;
- prohibit all hot spot work without a fire permit in the vicinity of the diesel tank;
- ensure that the retention is likely to contain 50% of the maximum capacity;
- display the unloading procedure near the tank area and enforce it (truck parked in reverse, collection tray, ground connection, fire extinguisher nearby, monitoring of operations, etc.);
- provide an earthing connection for the supply tanker;
- install emergency equipment (50kg powder fire extinguisher and a sandpit equipped with a spraying shovel) near the tank;
- ensure that the electrical installation of the premises is compliant;

- avoid the formation of vapours, mists or aerosols;
- after contact with the skin, wash immediately and thoroughly with soap and water;
- handle products in well-ventilated rooms;
- keep products away from food and beverages;
- inspection, cleaning and maintenance of the storage tank must be carried out according to strict procedures and should only be carried out by qualified personnel;
- do not smoke near the tank;
- never start the siphoning of the tank with the mouth; - Wear appropriate protective clothing;
- never drill, prick, grind, cut or weld the tank, even if empty;
- avoid prolonged and repeated contact with the skin, they can cause skin conditions favoured by small wounds or rubbing with soiled clothing;
- remove any soiled or splattered clothing;
- avoid contact with strong oxidizing agents;
- Use only hydrocarbon-resistant containers, seals, pipes, etc.

1.2.2. Emergency Remedial Measures

The operation phase of the project will be characterised by polluting emissions and the risk of personal accidents due to the operation of the facilities. The risks of notable accidents are:

- fire (e.g., flammable liquids);
- poisoning (e.g., aerosols).

The measures to be taken are:

✓ **Material and personal accidents**
- Quickly assess the scene by noting the type of accident, the possible hazards and the number of people injured, as well as the nature of the bodily injury.
- check the hazards present at the scene and anticipate other possible hazards;
- if dangers exist, control them (e.g. turn off all electrical sources, control leaks of flammable liquids and gases, secure unstable elements, control traffic, etc.);
- not to put one's life or the life of others in danger!
- to administer first aid to the wounded;
- stay close to the victim and arrange immediate transport to the nearest health centre;
- If the accident is caused by contact with electricity, do not touch the victim. Cut off the power at its source, as far as possible;
- If this is not possible, use a dry, unpainted wooden stick to break electrical contact or move electrical cables.
- Never move the victim unless he or she is in immediate danger!

✓ **In the event of an explosion**
- determine the nature of the emergency;
- Identify the affected area and determine if there are any other hazards.
- help all victims get to a safe area;
- secure the area only while waiting for the victims to be taken care of.

✓ **In case of heavy rain – storm wind – violent thunderstorm**
- secure with a lightning rod installations and loose objects that could be projected;
- to take all staff to safety;
- cut off the power supply to all operations, plants, machines or other energy sources, if necessary;
- stay inside buildings.

✓ **In case of pollution**
- keep staff away from the area concerned;
- not attempt the recovery of hazardous substances unless they have received special instruction and the appropriate equipment to do so;
- Inform local authorities and relevant departments if they are hazardous substances.

1.2.3. Specific preventive measures

When the alert is given or when he is notified orally of a state of emergency, the operational manager must immediately realize the exact reason for the emergency and the seriousness of the emergency.
He will have to judge whether a total or partial evacuation is required.
It triggers the central alert system if the Director has been notified of a state of emergency orally.
The Evacuation Signal is given and directed with the assistance of all members of the Emergency Measures Team and ensures that the evacuation is carried out in an orderly and expeditious manner.

He notifies the general management and the emergency services.
The Inspector must know the number of staff members who are on site at the time of the alert to ensure that no one is missing.

2. Emergency Response Development:

The company will implement a contingency plan to respond safely, quickly and effectively to potential incidents that may result from project activities. Emergency response activities are designed to directly address all emergencies and their consequences, as well as to establish command and control of the scene of the incident, ensure the safety of responders, develop action plans, and facilitate communications. Based on the results of the hazard analysis, an emergency plan will be prepared for the activity and will be specific to the project. The emergency situations addressed in the plan will include:

- the supply of materials for the construction and operation of the facilities;
- accidental spills (used oils, hydrocarbons);
- fires or explosions;
- staff (e.g., in case of injury);
- evacuations (e.g., for medical reasons);
- natural disasters (e.g. flooding);
- transport - personnel or equipment;
- safety;
- loss of material property;
- impacts on the public (e.g., ecological impacts).

The following sections provide information on the organisation of the emergency plan, communication protocols, vulnerable resources, training and exercise procedures, and emergency response.

2.1. Emergency Response Organization

To organize and manage emergency response activities, the company will implement an incident management system whose primary objective is to establish and maintain command and control

of incidents and emergency response activities. An incident management team is available 24 hours a day to ensure the mobilization of response resources in the event of an incident.

2.1.1. Internal and external communication

As described above, the incident management system defines roles and responsibilities in the event of an emergency, including the protocol for communicating in the event of an emergency. The emergency response plan documents the internal communication protocol between employees and provides detailed contact information for each party. The plan should also list the contact details and protocol to be followed for third parties such as the relevant technical services, and local and regional authorities.
In addition to communications with the relevant technical services, and local and regional authorities, communication with the national and local media will be carried out exclusively by a spokesperson appointed by the company.

2.1.2. Vulnerable resources

The plan also identifies vulnerable resources to quickly identify sensitivities that could potentially be affected during an incident. The risks of air pollution, surface water pollution, as well as noise pollution remain ecological concerns.

2.1.3. Training and Practice Procedure

Training in incident response and management procedures for all emergency response personnel will be mandatory. Emergency management team training includes the following topics:

- notification procedures/requirements for the facility's activities, internal response organization, relevant departments, subcontractors and the information required for these organizations;
- a communication system used for notifications and interventions;
- information on products stored, used or transferred, including familiarization with material safety data sheets, special handling procedures, health and safety hazards, accidental spill and fire procedures;
- scenarios of potential incidents and intervention procedures;
- an incident management system used to manage the response;
- human impact.

In addition to training, the emergency response plan will include emergency response exercises to ensure familiarity with site-specific roles and responsibilities and ecological and social sensitivities. The results of the exercises will be recorded and reviewed to identify gaps and limitations. Based on these results, the activity's emergency response strategy will be updated as required. An emergency response exercise will be conducted annually.

2.2. Response Plan

In the event of an incident on the network, the units responsible for monitoring and intervention aim to implement the necessary means to ensure the safety of people and property as quickly as possible. There are four phases of intervention:

- alerting;
- recognition;
- the safety measures;
- emergency repair.

2.2.1. Alert

The alert includes the entire process of knowing, transmitting and first verifying information. It allows the departments concerned to be notified of an incident affecting a structure and/or installation. It must ensure the rapid, complete and accurate transmission of information relating to an incident. The alert makes it possible to take the first steps to enable the intervention unit to ensure safety and to remedy any anomalies observed or reported. The alert allows all necessary measures to be taken to deal with the possible consequences of the incident. It is usually given by a local observer. The initial alert is received by the Director of Operations who transmits it immediately:

- to the management of the company;
- Rapid Response Officers.

The Director of Operations requests the shutdown or start-up of the installations.

2.2.2. Recognition

It is triggered after receiving the alert message. It must make it possible to obtain the validation of the alert given and the exact location of the incident as soon as possible. Reconnaissance is carried out by the "intervention" unit. It consists of collecting information to take all appropriate measures concerning safety, to inform the services concerned by the incident in a precise manner and to decide on the mode of intervention.

In this phase, it is necessary to:

- take the first steps with third parties;
- assess the perimeter of the danger zone;
- trigger the safety order.

2.2.3. Safety

Safety consists of taking the first measures on the buildings' installations. This phase aims to limit the disaster or quickly reduce its effects, possibly safeguarding a certain continuity of operation, if the safety of people and property allows it.

✓ ***Securing a pipeline***

The safety manoeuvres of a damaged installation may consist, depending on the circumstances, of:

- isolate the section concerned by the closure of the two shut-off valves;
- To lower the pressure in the damaged section, in order to maintain minimal transit while reducing leakage or reducing local stresses at the breach.

✓ ***Emergency repair***

Emergency repair consists of repairing the damaged structure temporarily or permanently. A temporary repair makes it possible to restore the transit of gas under normal safety conditions pending the opportunity for a permanent repair.

✓ ***Interim Repair***

Various methods are applied depending on the extent and nature of the damage:

- sealing of the leak by a two-piece repair sleeve;
- Placing a sleeve between two repair sleeves;
- replacement of several lengths of tubes by the use of a temporary ramp, etc.

✓ ***Permanent repair***

It consists of replacing defective installations with new ones.

2.3. Restricting access to the project site

Security of access will be ensured by security guards at the security post located at the entrances and exits of the site. This will allow the protection of personnel and equipment from any act of vandalism. Also, road safety will be organized in such a way as to avoid traffic accidents at the entrance to and around the site.

2.3.1. Safety Register

- establish a safety register and record the various safety-related activities: maintenance, testing and verification of safety equipment, as well as evacuation and fire drills;
- present this document to any local or regional entity involved in security.

2.3.2. Waste register

Establish a waste register in accordance with environmental regulations. The waste register will have to record the quantities, nature, method of disposal and the various movements of waste produced on the site.

IX. Environmental and Social Management Plan (ESMP)

1. Introduction:

The Environmental and Social Management Plan (ESMP) is the document for the implementation and monitoring of the measures envisaged by the ESIA to eliminate, reduce and possibly compensate for the harmful consequences of the project on the various components of the environment. This plan is a very important element of the ESIA that will later serve as the basis for the formulation of the environmental specifications.

The company will adopt a management plan that reflects its commitment to a few fundamental principles, which are: (i) the choice of relevant environmental indicators; (ii) the distinction of the duties of society and (iii) the consultation of the people.

The objective of this plan is to ensure that all impacts identified in the ESIA are effectively managed during the project phases. This includes the removal or reduction of potential negative impacts, and the promotion of positive impacts for the benefit of the population.

The preparation and implementation of the ESMP is a requirement of the current ESIA process and also provides a commitment to the relevant jurisdiction that the results of the study will be effectively implemented during the project phases.

It is essential to emphasize that the GGP must be a living document that will be periodically reviewed and updated.

2. ESMP Implementing Entities:

Monitoring and monitoring, as well as the definition of the roles and responsibilities of the entities involved in the implementation of the GGP, are carried out as follows:

2.1. Internal monitoring of the implementation of environmental and social measures:

- **Small-scale mine management:** This will have overall responsibility for the implementation of the plan. It will ensure that environmental activities are carried out in accordance with the regulations in force.
- **Responsibilities of the HSE Officer:** planning the execution of the plan's measures, preparing the plan's implementation reports and specific reports (e.g. accident reports), participating in weekly meetings and monthly monitoring meetings, welcoming staff, receiving environmental and social monitoring missions.
  He will intervene during all phases of the project and will be permanently mobilized .
  Reporting : It will prepare a monthly report on the implementation of environmental and social measures that it will submit to the Mine Management for review and approval. It will also draw up the specific reports required by the ESMP (e.g. environmental incident reports, accident reports, etc.).
- **Responsibilities of the Environmental Safeguard Expert (ESA):** He/she will plan missions to monitor environmental activities in the field and support the HSE manager in the implementation of the ESMP.
  It will intervene periodically.
  Reporting: It will develop an environmental monitoring report after each mission that it will submit to the Mine Management for review and approval.
- **Responsibilities of the Social Safeguard Expert (SSE):** He or she will plan missions to monitor social activities in the field and support the HSE manager in the implementation of the ESMP.

It will intervene periodically.
Reporting: He will prepare a follow-up report on social activities after each mission that he will submit to the Mine Management for review and approval.

2.2. External monitoring of the implementation of environmental and social measures by the interministerial technical monitoring committee:

- **Responsibility of the committee under the leadership of the National Directorate for Sanitation and Control of Pollution and Nuisances (DNACPN):** It will monitor the implementation of the measures contained in the ESMP through on-site monitoring.
  He will intervene quarterly during all phases of the project.
  Reporting : The interministerial technical monitoring committee will carry out monitoring reports in order to highlight compliance and non-compliance with environmental protection on the site.

3. Environmental monitoring:

Environmental monitoring that includes the execution of mitigation measures is the responsibility of the company. To do this, the company will put rigor in monitoring the progress of the operation of the small mine. It will therefore ensure that activities are carried out in compliance with environmental requirements. In addition, it will have to implement a health, safety and environmental risk management approach in order to ensure that significant aspects are controlled throughout the duration of the project.

This is how the company will set up and execute:

- procedures for conducting field work;
- a waste management procedure;
- a liquid discharge management procedure;
- a training program;
- an emergency plan including emergency alert and evacuation provisions;
- an environmental monitoring procedure.

This monitoring task will be entrusted to the Health, Safety and Environment (HSE) manager so that he or she carries out periodic evaluations to ensure the effective implementation of the provisions prescribed in the ESIA. Parameters will have to be monitored according to the environmental components impacted.

Firefighting equipment (PI, RIA, fire extinguishers, smoke detectors) and electrical installations will also have to be checked quarterly to ensure their effectiveness.

4. Action Items:

Environmental monitoring is the responsibility of the technical services. Their mission will be to evaluate all actions in terms of environmental protection. They will organise periodic site visits (quarry, factory and remote site) by measuring the long-term effectiveness of the means implemented and by collecting data that will contribute to advancing knowledge in terms of environmental protection and sustainable management. The environmental monitoring program will ensure that mitigation measures are applied and document certain long-term impacts of the project on the environment.

This monitoring program will have to be supported by environmental indicators that will make it possible to identify the evolution of the state of the components of the environments. The environmental components that will need to be monitored as part of this project are as follows:

- flora;
- fauna;
- waters;
- the soil;
- ambient air;
- the soundscape;
- health;
- security;
- local employment.

To do this, an interministerial technical committee will be set up to ensure follow-up. It is desirable to involve all relevant stakeholders in the monitoring committee. During the monitoring, the effectiveness of the means implemented will be measured.

The follow-up program is based on the following elements:

- the control of the proper functioning of the installations;
- the quality control of atmospheric emissions;
- regular monitoring of the effective emptying of machinery and liaison vehicles;
- periodic monitoring of water quality;
- monitoring compliance with health measures;
- monitoring compliance with safety measures;
- monitoring of soil restoration work;
- verification of the proper functioning of the emergency management plan;
- verification of compliance with security procedures;
- monitoring the recruitment of local employees.

5. Training and awareness-raising:

Training and awareness-raising will be based on the following actions:

Table 28. Training and Awareness Topics

Themes	Target Audiences
Raising awareness of the risks of road traffic accidents	- Company drivers; -Populations.
Awareness of the risks of accidents at work	All staff on site
Raising awareness of health risks	-All staff on site; -Populations.
Awareness of the use of personal protective equipment	All staff on site
Weekly Quarter of an Hour Health - Safety - Environment	All staff on site
Fire Safety Training	Technical staff
First Aid and Rescue Training	Technical staff
Training in remediation protocols	Technical staff
Eco-gesture training	All staff on site
Training and awareness on environmental management	All staff on site

6. Modalities of implementation of the proposed measures:

The implementation of the proposed measures includes the definition of responsibilities for each of the measures, as well as the implementation periods and monitoring indicators.

The table below gives a summary of each of the measures identified and presents the responsibilities as well as the monitoring indicators to ensure the control of their effectiveness.

What should be noted is that the execution of monitoring measures during all phases of the project is the responsibility of the company. Indeed, even if the implementation of a certain number of measures in the phases are not directly implemented by it and this is the role played by the subcontractors, the company has the obligation to ensure their effectiveness; for with regard to the administration, he assumes responsibility for it.

Table 29. Environmental and Social Management Plan Implementation Matrix

Project Phase	Area concerned	Activity/source of potential impact	Affected Component	Nature of the potential impact	Mitigation measures	Supervisor	Follow-up manager	Monitoring indicator	Source of Audit	Source of funding
Installation			Health	-Risk of respiratory discomfort due to the flight of dust; -Risks of deterioration of hygiene conditions.	- Provide dust masks to staff; - Install and regularly maintain the construction toilets; - Provide pharmacy boxes; -Provide drinking water to staff.	HSE/Society ESE and SSE	DGS-HP/DRS-CSRef.	-Number of people affected; -Number of toilets; - Number of pharmacy boxes; -Availability of drinking water.	- Report of the society; - DGS-HP monitoring report; -RefCo Reports	SERM SA
			Security	-Risks of traffic accidents -Risks of work accidents	- Install and respect road signs; -Install flag bearers; -Limit the speed; - Raise awareness among the company's drivers; -Provide PPE to staff; -Respect the mandatory wearing of PPE.	HSE/Society ESE and SSE	PWCB/CPD DNACPN/DRACPN	- Number of panels installed; - Compliance with the speed limit; -Number of awareness sessions; -Number of PPE; -Respect for the wearing of PPE	- Report of the society; - Technical Services Monitoring Report.	SERM SA
	Quarry sites, factory and remote site	Clearing brush and cleaning of rights-of-way	Landscape	Risks of changes in landscape appearance	Maintain the natural vegetation screens around the site.	HSE/Society ESE and SSE	DGEF/DREF DNGM DNACPN/DRACPN	The vegetation around the site is maintained.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Ambient air	Risks of air pollution by dust.	- Humidify the work areas and water the access roads; -Respect the watering frequency; - Comply with standards for reducing the emission of pollutants into the atmosphere; - Regularly maintain the machines; -Reduce the speed to 20km/h for vehicles in dry periods.	HSE/Society ESE and SSE	DGS-HP/DRS DNACPN	-Number of waterings per day; -Compliance with air emission standards.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Soundscape	Noise risks	- Use equipment equipped with noise limitation systems; - Prohibit noisy work at night; -Regularly maintain motorized vehicles.	HSE/Society ESE and SSE	DNACPN/DRACPN DGS-HP/DRS	-The machines are less noisy; -Noisy work is forbidden at night; -Motorized vehicles are regularly maintained.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Flora	Risks of destruction of vegetation cover	-Strictly use the open spaces for the project; - Avoid felling trees as much as possible;	HSE/Society ESE and SSE	DGEF/DREF	- Number of trees felled;	- Report of the society; - DGEF/DREF follow-up report.	SERM SA

SERM SA

Project Phase	Area concerned	Activity/source of potential impact	Affected Component	Nature of the potential impact	Mitigation measures	Supervisor	Follow-up manager	Monitoring indicator	Source of Audit	Source of funding
					- Raise awareness among staff; - Proceed with compensatory reforestation.			- Number of hectares reforested in compensation.		
			Fauna	-Risks of disturbance of natural habitats; -Risks of wildlife migration.	- Limit brush clearing to the perimeter of the installation of infrastructure and equipment; - Avoid crushing wildlife by machines as much as possible; - Prohibit the hunting of game by staff.	HSE/Society ESE and SSE	DGEF/DREF	Disturbance of wildlife habitats is limited; The staff is made aware and hunting is prohibited.	- Report of the society; - DGEF/DREF follow-up report.	SERM SA
		Excavations and earthworks	Ground	-Risks of soil weakening; -Risks of accidental oil spills on the ground.	- Optimize the space dedicated to excavation and earthworks; -Close the holes; - Apply the required protocols for remediation.	HSE/Society ESE and SSE	DGEF/DREF DNACPN/DRACPN DNGM	-The holes are closed; -The decontamination protocols are applied.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Sites of cultural/archaeological interest	Risks of discovery of ancient objects.	- Immediately stop work in the area concerned; - Inform the mine management; - Secure the perimeter; - Involve the competent department; - Resume work in the area only after the favourable opinion of the competent department.	HSE/Society ESE and SSE	DNPC DNGM	-Number of ancient objects discovered; - Nature of the objects discovered; - Surface area concerned; -Competent department is involved in the procedure for the protection of the site.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
		Infrastructure and building construction	Landscape	Risks of changes in landscape appearance	Maintain the natural vegetation screens around the site.	HSE/Society ESE and SSE	DGEF/DREF DNGM DNACPN/DRACPN	The vegetation around the site is maintained.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Security	Risks of occupational accidents	-Provide PPE to staff; - Respect the mandatory wearing of PPE; - Post safety instructions on the site; - Prohibit the use of narcotics (alcohol, drugs, etc.); - Respect the internal rules posted on the site; - Organize quarter-hour sessions on the risk of accidents.	HSE/Society ESE and SSE	PWCB/CPD	-Number of PPE; - Respect for the wearing of PPE; - Safety instructions are posted; Narcotics are prohibited on the construction site; -Quarter of an hour is organized; -The internal rules are posted on the website	- Report of the society; - Follow-up report of the DGPC/DRPC.	SERM SA
				Fire Hazards	- Install fire extinguishers; - Develop and implement an Internal Operation Plan (POI) in	HSE/Society ESE and SSE	PWCB/CPD	- Number of fire extinguishers installed;	- Report of the society; -PWCB/CPDP Follow-up Report	SERM SA

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Project Phase	Area concerned	Activity/source of potential impact	Affected Component	Nature of the potential impact	Mitigation measures	Supervisor	Follow-up manager	Monitoring indicator	Source of Audit	Source of funding
					collaboration with the General Directorate of Civil Protection; - Train staff in first aid, handling, extinguishing, rescue and clearance; - Have emergency means available in high-risk areas: fire hydrants (PIs), armed fire hoses (RIA), etc. - Organize annual simulation exercises with the General Directorate of Civil Protection; - Schedule prevention visits by the Civil Protection.			- The internal emergency plan is developed and operational; -Number of people trained in first aid and rescue; - Emergency resources are available in places at risk; -The simulation exercise is organized every year.		
			Soundscape	Risks of noise pollution (noise)	- Use equipment equipped with noise limitation systems; - Prohibit noisy work at night; -Regularly maintain motorized vehicles.	HSE/Society ESE and SSE	DNACPN/DRACPN DGS-PH/DRS	-The machines are less noisy; -Noisy work is forbidden at night; -Motorized vehicles are regularly maintained.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Surface water	Risks of pollution of runoff water	- Put retention basins around the hydrocarbon tanks; - Also set up sandboxes;	HSE/Society ESE and SSE	DNH/HRD DNACPN/DRACPN	- Hydrocarbon tanks are equipped with retention basins;		
			Groundwater	Risks of pollution of the water table by infiltration	- Refuel the machines using a distribution pump; - Setting up a waste collection and evacuation system; - Setting up platforms for the storage of engine oils; -Install bins to facilitate the pre-collection of waste.			-Sandboxes are available; -The machines are refuelled using the distribution pump; - Number of bins installed; - Number and area of watertight platforms built.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
		Presence of the workforce	Health	Risks of the spread of STIs and HIV-AIDS.	- Raise awareness of the risks of spreading STIs and HIV-AIDS; - Organize quarter-hour sessions on health risks.	HSE/Society ESE and SSE	DGS-HP/DRS	- Number of awareness-raising sessions on the risks of STIs and HIV-AIDS; - Quarter hours are organized	- Report of the society; -DGS-HP/DRS follow-up report	SERM SA
		Staff Recruitment	Employment	Job Opportunities	- Promote the recruitment of nationals from the surrounding villages;	HSE/Society ESE and SSE	DNPSES DNACPN/DRACPN Town halls Village chiefdoms	Number of local workers recruited by the company;	- Report of the society; - Follow-up report of the DNACPN/DRACPN;	SERM SA

Project Phase	Area concerned	Activity/source of potential impact	Affected Component	Nature of the potential impact	Mitigation measures	Supervisor	Follow-up manager	Monitoring indicator	Source of Audit	Source of funding
					- Enforce the law in terms of worker recruitment.			- Compliance with the law in terms of worker recruitment.	- Reports from the town halls.	
		Local development	Roads/tracks	Rehabilitation of village tracks	Reprofile the roadway and build crossing structures.	HSE/Society ESE and SSE	DNPSES DNGM DNACPN/DRACPN DGCT Town halls Village chiefdoms	- Number of reprofiled tracks; -Number of structures built.	- Report of the society; - Follow-up report of the DNACPN/DRACPN; - Reports from the town halls.	SERM SA
	Careers	Ore extraction	Landscape	Risks of local relief modification	Dispose of waste rock near the quarry in a manner that conserves the surrounding natural resources.	HSE/Society ESE and SSE	DNGM DNACPN/DRACPN DGEF	The waste rock deposits arranged around the quarry.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Ground	-Risks of soil weakening; -Erosion risks.	-Stabilize the surroundings of excavation holes to reduce the risk of water erosion; - Mechanically or biologically fix the waste rock deposits on the slopes to reduce the risk of landslides; - Install anti-erosion devices (e.g. stonework) in vulnerable areas; - Install watertight platforms for the storage of polluting materials (hydrocarbons, engine oils, greases, etc.); -Install a hydrocarbon separator system on the vehicle washing and maintenance area.	HSE/Society ESE and SSE	DNGM DNACPN/DRACPN DGEF	-The surroundings of the excavation holes are stabilized; -Water erosion is less visible; -The slopes of the waste rock deposits are stable; - Anti-erosion devices are in place; - Number of watertight platforms built for the storage of hydrocarbons.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Ambient air	Risks of air pollution by dust.	-Humidify the areas of the quarry in operation and the truck traffic lanes; -Humidify the spaces around the ore storage area to reduce dust flight during handling.	HSE/Society ESE and SSE	DNACPN/DRACPN DGS-HP/DRS	Number of watering of areas under construction	- Report of the society; - Technical Services Monitoring Report.	SERM SA
Exploitation			Security	Fall hazards	- Prohibit people from entering areas in operation (e.g. quarry); -Install safety barriers around the holes; - Park guards around the quarry;	HSE/Society ESE and SSE	PWCB/CPD	- Entry to the quarries is forbidden to the population; -Linear safety fence implanted;	- Report of the society; -PWCB/CPDP Follow-up Report	SERM SA

SERM SA

Project Phase	Area concerned	Activity/source of potential impact	Affected Component	Nature of the potential impact	Mitigation measures	Supervisor	Follow-up manager	Monitoring indicator	Source of Audit	Source of funding
					- Install signs prohibiting access to the area; - Raise awareness among the surrounding population about the risks of falls.			- Number of guards stationed around the site; - Number of prohibition signs installed; - Number of awareness-raising sessions on the risks of falls		
	Access tracks	Ore Transportation	Security	Risks of road traffic accidents.	- Install and respect the road signs along the tracks and more particularly at the crossings ; - Install flag bearers at truck exits; -Limit the speed; - Require the headlights to be turned on; - Support local health centers with basic necessities to facilitate the management of traffic accidents; - Raise awareness among the company's drivers; - Raise awareness of the risks of road traffic accidents.	HSE/Society ESE and SSE	PWCB/CPD	- Number of road signs installed; -Number of flag bearers parked at intersections; - Compliance with the speed limit; - Number of awareness-raising sessions for drivers; -Number of traffic accidents recorded; -Number of accident victims taken careof .	- Report of the society; -PWCB/CPDP Follow-up Report	SERM SA
	Quarries, factory and remote sites	Generator set operation	Ambient air	Risks of CO2 air pollution	- Ensure regular maintenance of machines (e.g. generators) in order to minimize CO2 emissions; - Install a filter device on the machines; -Measure air quality using a handheld measuring device.	HSE/Society ESE and SSE	DNACPN/DRACPN DGS-HP/DRS	-The generators are maintained regularly; -The machines are equipped with filters; -Number of air quality measurements.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Health	Risk of respiratory discomfort due to CO2 suspended in the air	- Install an infirmary and provide first aid; - Organization of weekly quarter-hour sessions on health risks; - Support local health centers with essential medicines to facilitate the management of respiratory diseases caused by dust;	HSE/Society ESE and SSE	DNACPN/DRACPN DGS-HP/DRS	-The infirmary is functional; - Number of quarter-hour sessions; - Number of medical checks of the staff; - Number of essential medicines donated to health centres.	- Report of the society; - Technical Services Monitoring Report.	SERM SA

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Project Phase	Area concerned	Activity/source of potential impact	Affected Component	Nature of the potential impact	Mitigation measures	Supervisor	Follow-up manager	Monitoring indicator	Source of Audit	Source of funding
			Security	Risks of occupational accidents	- Carry out periodic medical checks of staff. -Provide PPE to generator set maintenance personnel - Require compliance with the mandatory wearing of PPE; -Display safety guidelines at the platform where the groups are installed.	HSE/Society ESE and SSE	PWCB/CPD	-Number of PPE provided; - Respect for the wearing of PPE; -Safety instructions are posted.	- Report of the society; -PWCB/CPDP Follow-up Report	SERM SA
			Soundscape	Noise risks	- Make it compulsory for exposed personnel to wear a helmet or earplug; - Soundproofing noisy equipment (e.g. crushers, generators, etc.); - Measure the noise pollution by a sound level meter in order to comply with the required standards.	HSE/Society ESE and SSE	DNACPN/DRACPN DGS-HP/DRS	- Respect for the wearing of noise-cancelling headphones; -The machines are soundproofed; - Number of noise pollution measures.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
		Waste generation	Landscape	Risks of unsanitary conditions on sites due to ordinary waste	- Install bins for pre-collection; - To set up a platform for the deposit and selective sorting of waste; - Incinerate non-hazardous solid waste (paper, cardboard, wood debris, etc.); - Recruit maintenance workers to ensure the cleanliness of the site.	HSE/Society ESE and SSE	DNACPN/DRACPN	- Number of bins installed; - Number of platforms developed; - Number of cleaners recruited.	- Report of the society; -Follow-up report of the DNACPN/DRACPN	SERM SA
			Ground	Soil pollution risks	- Store hazardous waste on watertight and fenced platforms; - Collect and dispose of used oils by an approved company; -Collect oil filters, batteries and used tyres.	HSE/Society ESE and SSE	DNACPN/DRACPN	-Waste is stored on watertight platforms; -An approved company is responsible for the disposal of the waste.	- Report of the society; -Follow-up report of the DNACPN/DRACPN	SERM SA
			Health	Risks of disease spread from biomedical waste	- Install tricolor bins (red, yellow and black) for sorting waste from the infirmary; - Evacuate the safety boxes containing the injection needles to the health centers; - Evacuate the waste to be incinerated to health centers.	HSE/Society ESE and SSE	DGS-HP/DRS DNACPN/DRACPN	- Number of tricolor bins installed; - Security boxes are evacuated to health centers; -Waste is incinerated at health centres.	- Report of the society; - Technical Services Monitoring Report.	SERM SA

SERM SA

Project Phase	Area concerned	Activity/source of potential impact	Affected Component	Nature of the potential impact	Mitigation measures	Supervisor	Follow-up manager	Monitoring indicator	Source of Audit	Source of funding
			Surface water	Risks of pollution of runoff water	- Respect the regulatory distances (500m) between the facilities and the watercourses; - Implement a water quality monitoring program.	HSE/Society ESE and SSE	DNH/HRD DNACPN/DRACPN	-The regulatory distances are respected; -A follow-up program is set up	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Groundwater	Risks of groundwater pollution by infiltration of liquid waste.	- Sealing the mud basin; - Carry out physico-chemical and bacteriological analyses before the start of mine operation; - Establish a monitoring program for the quality of the water table (wells) in the surrounding villages; - Build septic tanks at the level of the living quarters for the treatment of domestic wastewater.	HSE/Society ESE and SSE	DNH/HRD DNACPN/DRACPN	-The mud basin is watertight; - Water analyses are carried out before the start of operation; - A follow-up program is set up; - Number of septic tanks built.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Health	Risks of deterioration of hygiene conditions	-Maintain sanitation on the site; - Provide drinking water; - Provide mosquito nets to the residents of the living quarters; -Build toilets that comply with hygienic standards (respect for the person/toilet ratio); - Organize weekly quarter-hour sessions on health risks.	HSE/Society ESE and SSE	DGS-HP/DRS DNACPN/DRACPN	- Sanitation is maintained on the site; -Drinking water is available; -Number of mosquito nets provided; -Number of toilets; -Frequency of toilet maintenance; -Number of quarter-hour sessions organized.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Security	Fire Hazards	- Install fire extinguishers; - Develop and implement an Internal Operation Plan (POI) in collaboration with the General Directorate of Civil Protection; - Train staff in first aid, handling, extinguishing, rescue and clearance; - Have emergency means available in high-risk areas: fire hydrants (PIs), armed fire hoses (RIA), etc.	HSE/Society ESE and SSE	PWCB/CPD	- Number of fire extinguishers; -Operational POI; - Number of emergency resources; - Number of simulation exercises; -Number of Prevention Visits	- Report of the society; -PWCB/CPDP Follow-up Report	SERM SA

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Project Phase	Area concerned	Activity/source of potential impact	Affected Component	Nature of the potential impact	Mitigation measures	Supervisor	Follow-up manager	Monitoring indicator	Source of Audit	Source of funding
					- Organize annual simulation exercises with the General Directorate of Civil Protection; - Schedule prevention visits by the Civil Protection.					
		Disposal of waste rock	Ground	Risks of material collapse	- Mechanically or biologically fix the waste rock deposits on the slopes to reduce the risk of landslides; - Install anti-erosion devices (e.g. stonework) in vulnerable areas.	HSE/Society ESE and SSE	DNGM DNACPN/DRACPN DGEF/DREF	-The embankments are stabilized; - Number and type of anti-erosion devices in place	- Report of the society; - Technical Services Monitoring Report.	SERM SA
		Drainage of water from the mud basin	Surface water	Muddy water runoff hazards	- Respect the regulatory distances (500m) between the facilities and the watercourses; -Regularly check the settling device at the level of the sludge basin.	HSE/Society ESE and SSE	DNGM DNACPN/DRACPN DGEF/DREF	-The regulatory distance is respected; - Number of checks of the decanting device.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
		Presence of the workforce	Health	-Risks of spreading STIs and HIV-AIDS; -Risks of consumption of prohibited products.	- Raise awareness of health risks, in particular the risks of the spread of STIs and HIV-AIDS; - Distribute condoms for staff; - Prohibit the use of narcotics (alcohol, drugs, etc.) during working hours.	HSE/Society ESE and SSE	DGS-HP/DRS DNACPN/DRACPN	- Number of awareness-raising on STIs and HIV-AIDS; - Number of condoms distributed; - Effectiveness of the prohibition of drugs during work.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
		Staff Recruitment	Employment	Job Opportunities	- Promote the recruitment of nationals from the surrounding villages; - Enforce the law in terms of worker recruitment.	HSE/Society ESE and SSE	DNPSES DNGM DNACPN Town halls Village chiefdoms.	-Number of local workers recruited; -Employment contracts.	- Report of the society; - Technical Services Monitoring Report; - Report of the town halls.	SERM SA
		Local development	Strengthening medical care	Improving the quality of care	Support health centres in the area by providing them with essential medicines.	HSE/Society ESE and SSE	DNPSES DNGM DNACPN DGS-HP/DRS DGCT Town halls Village chiefdoms.	Quantity of essential medicines made available to health centres.	- Report of the society; - Technical Services Monitoring Report; - Report of the town halls.	SERM SA

SERM SA

Project Phase	Area concerned	Activity/source of potential impact	Affected Component	Nature of the potential impact	Mitigation measures	Supervisor	Follow-up manager	Monitoring indicator	Source of Audit	Source of funding
	Quarries, factory and remote site	Dismantling of equipment and infrastructure	Health	Hazards of Hazardous Waste Contamination	- Store hazardous waste on watertight and fenced platforms; - Collect and dispose of used oil by an approved company; -Collect oil filters, batteries and used tyres.	HSE/Society ESE and SSE	DGS-HP/DRS DNACPN/DRACPN	-Hazardous waste is stored on watertight platforms; -An approved company evacuates hazardous waste.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Security	Risks of occupational accidents	-Provide PPE to the dismantling team; - Require compliance with the mandatory wearing of PPE; - Raise awareness of safety instructions; - Ban narcotics (alcohol, drugs, etc.) during working hours.	HSE/Society ESE and SSE	PWCB/CPD	-Number of PPE provided; - Respect for the wearing of PPE; -Safety instructions are posted; -Effective prohibition of narcotics during work.	- Report of the society; - Follow-up report of the DGPC/DRPC.	SERM SA
			Soundscape	Noise risks	- Make it compulsory for exposed personnel to wear a helmet or earplug; - Soundproofing noisy equipment (e.g. crushers, generators, etc.); - Measure the noise pollution by a sound level meter in order to comply with the required standards.	HSE/Society ESE and SSE	DNACPN/DRACPN DGS-HP/DRS	- Respect for the wearing of noise-cancelling headphones; -The machines are soundproofed; - Number of noise nuisance measurements; -Decibel emitted.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
Closure		Surface leveling	Health	Risk of respiratory discomfort due to dust	- Require the wearing of dust masks; -Moisten surfaces during leveling and spreading of materials.	HSE/Society ESE and SSE	DGS-HP/DRS DNACPN/DRACPN	- Number of dust masks provided; - Respect for the wearing of masks; -Moistened surfaces; -Frequency of watering of active areas.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Security	Risks of occupational accidents	-Provide PPE to staff; - Require compliance with the mandatory wearing of PPE; -Require compliance with safety instructions.	HSE/Society ESE and SSE	PWCB/CPD	-Number of PPE provided; - Respect for the wearing of PPE; -Safety instructions posted.	- Report of the society; - Follow-up report of the DGPC/DRPC.	SERM SA
			Soundscape	Noise risks	- Make it compulsory for exposed personnel to wear a helmet or earplug;	HSE/Society ESE and SSE	DNACPN/DRACPN DGS-HP/DRS	- Respect for the wearing of noise-cancelling headphones;	- Report of the society; - Technical Services Monitoring Report.	SERM SA

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Project Phase	Area concerned	Activity/source of potential impact	Affected Component	Nature of the potential impact	Mitigation measures	Supervisor	Follow-up manager	Monitoring indicator	Source of Audit	Source of funding
					- Soundproofing noisy equipment (e.g. crushers, generators, etc.); - Measure the noise pollution by a sound level meter in order to comply with the required standards.			-The machines are soundproofed; - Number of noise nuisance measurements; -Decibel emitted.		
		Spreading of deposited materials	Health	Risk of respiratory discomfort due to dust	- Require the wearing of dust masks; -Moisten surfaces during leveling and spreading of materials.	HSE/Society ESE and SSE	DGS-HP/DRS DNACPN/DRACPN	- Number of dust masks provided; - Respect for the wearing of masks; -Moistened surfaces; -Frequency of watering of active areas.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
			Security	Risks of occupational accidents	-Provide PPE to staff; - Require compliance with the mandatory wearing of PPE; -Require compliance with safety instructions.	HSE/Society ESE and SSE	PWCB/CPD	-Number of PPE provided; - Respect for the wearing of PPE; -Safety instructions posted.	- Report of the society; - Follow-up report of the DGPC/DRPC.	SERM SA
		Presence of the workforce	Health	Risks of the spread of STIs and HIV-AIDS	- Raise awareness of health risks, in particular the risks of the spread of STIs and HIV-AIDS; -Distribute condoms for staff.	HSE/Society ESE and SSE	DGS-HP/DRS DNACPN/DRACPN	- Number of awareness-raising sessions on STIs and HIV-AIDS; -Number of condoms distributed.	- Report of the society; - Technical Services Monitoring Report.	SERM SA
		Local development	Drinking water	Drinking water supply	Equip the boreholes carried out on the sites for the benefit of the surrounding populations at the closure of the mine.	HSE/Society ESE and SSE	DNPSES DNGM DNACPN/DRACPN DNH/HRD DGCT Town hall Village chiefdom	Number of boreholes equipped for the surrounding populations	- Report of the society; - Technical Services Monitoring Report.	SERM SA

7. Evaluation of the cost of the main environmental and social measures:

The costs of most mitigation measures are built into the project and must be factored into the company's specifications.
The estimate of these costs is based on data collected from certain technical services and the costs usually charged in Mali.

7.1. Cost of measures integrated into the project:

The cost of implementing the measures to be included in the project is taken into account in the unit prices of the small-scale mine work.
These include:

- the provision of PPE to staff;
- the supply of sanitary equipment;
- security;
- waste management;
- the fight against pollution;
- firefighting;
- site restoration;
- the preservation of water resources;
- local development, etc.

7.2. Cost of measures concerning compensatory reforestation:

Given the relevance of compensatory reforestation, the company will plant trees on an area of 15 ha. The details are recorded in the table below.

Table 30. Cost of compensatory reforestation

Designation	Unit	Quantity	Unit price	Total Amount
1. Demarcation and brush clearing				
Delineation and mapping	h/d	1	50 000	50 000
Slashing	ha	15	40 000	600 000
Subtotal 1				**650 000**
2. Means of dewatering				
Drilling, Castle and drip irrigation	Number	2	15 000 000	30 000 000
Subtotal 2				**30 000 000**
3. Purchase of plants and transport				
Purchase of plants (7*7)	Number	3 075	1 250	3 843 750
Transport	Number	3 075	25	76 875
Subtotal 3				**3 920 625**
4. Plantation				
Staking and drilling	ha	15	51 250	768 750
Planting the plants	ha	15	20 500	307 500
Reseeding (10% of plants)	Number	307, 5	1 250	384 375
Subtotal 4				**1 460 625**
5. Security				
Fence with wire mesh	ha	15	800 000	12 000 000
Subtotal 5				**12 000 000**
6. Guarding and maintenance				
Guarding and maintenance for 2 years	Number	72	50 000	3 600 000
Subtotal 6				**3 600 000**
Total				**51 631 250**

7.3. Cost of the measures concerning the land clearing tax:

In accordance with the provisions of the forestry legislation, a land clearing tax will be paid to the Water and Forests Department. The unit cost of one hectare is 15,000 CFA francs, for a total cost of **225,000 CFA francs**.

7.4. Cost of the measures concerning the anti-erosion device:

To prevent soil degradation by water erosion around the quarry, it is proposed to build an anti-erosion system in stone barriers over a 2,500 m line. Due to 5,000 FCFA per meter, the total cost will amount to **12,500,000 FCFA.**

NB: Village labour can be used to make stone barriers. The population will be able to supply the site with rubble stones.

7.5. Cost of measures concerning the stabilization of the slopes of the waste rock deposits:

To stabilize the waste rock deposits against the risk of landslides during the wintering period, a fixing device at the level of the slopes over a total distance of 1,500 m is proposed. Due to 5,000 FCFA per meter, the total cost will amount to **7,500,000 FCFA.**

7.6. Cost of measures concerning awareness of STIs and HIV-AIDS:

To protect the health of staff and populations against STIs and HIV-AIDS. A biannual awareness-raising session is proposed in the village of Dalaba, i.e. twice a year.
The organization of an awareness session is estimated at 500,000 CFA francs. The total cost will be **1,000,000 CFA francs**.

NB: The municipality's CSCOM will be involved in the organisation of the awareness-raising sessions in collaboration with the mine's HSE manager.

7.7. Cost of road safety awareness measures:

To preserve the safety of staff and users against the risk of road traffic accidents. A biannual awareness-raising session is proposed, i.e. two (2) times a year.
The organization of an awareness session on road safety is estimated at 500,000 CFA francs. The total cost will be **1,000,000 CFA francs**.

7.8. Cost of training measures for capacity-building of local actors:

At the request of the populations and to allow local actors to better understand the content of the new mining code. Training for local actors is proposed, its cost is estimated at 2,500,000 CFA francs.
NB: The training will be given in the local language and will concern the following actors:

- the staff of the town hall;
- village councils;
- women's representatives;
- youth representatives.

Table 31. Estimating the costs of key environmental and social measures under the GGP

Designation	Unit	Quantity	Unit price (CFA francs)	Amount (F CFA)
Compensatory reforestation	ha	15	2 888 750	51 631 250
Land clearing tax	ha	15	15 000	225 000
Anti-erosion device	ml	2 500	5 000	12 500 000
Waste Rock Deposit Stabilization	ml	1 500	5 000	7 500 000
STI and HIV/AIDS awareness	u	2	500 000	1 000 000
Road safety awareness	u	2	500 000	1 000 000
Training, capacity building for local actors	u	1	2 500 000	2 500 000
Total				**76 356 250**

Conclusion

The project to exploit the small gold mine of Massala will certainly contribute to the socio-economic development of the beneficiary commune in terms of community projects. It raises a lot of expectations on the part of local authorities and populations.

Analysis of the environmental and social aspects of the project-related activities revealed potential negative impacts. These are generally the same as the common risks experienced in the implementation of any similar project. These include risks related to the destruction of natural resources (flora, fauna, water, etc.), the deterioration of ambient air quality, the waste generated (solid and liquid waste), accidents (fire, pollution, etc.), diseases linked to the presence of labour from elsewhere (STIs and HIV-AIDS), the discovery of ancient objects, and the modification of the landscape.

For a harmonious integration of the project into its natural environment, it is necessary to implement the recommendations that reinforce SERM SA's commitment to integrate the environment into the management of its activities. For each of the risks identified, control measures are taken into account by the project; which reduces their importance.

Because of the company's commitment to take into account the recommendations made at the end of this study and the provisions already in place, the implementation of the Massala small-scale gold mine project deserves to be authorized.

Bibliography

- Project Feasibility Report, September 2024;
- PDESC 2017 – 2021 of the rural commune of Baya, April 2019;
- PDESC 2023 – 2027 of the rural commune of Baya, March 2024;
- Summary of the Integrated and Sustainable Development Programme for the Sankarani Basin and its Strategic Environmental Assessment (PDIDBS/EES), October 2023

Annexes

Appendix 1: Terms of Reference

Appendix 2: Letter of Approval of Terms of Reference

Appendix 3: Public Consultation Minutes

Appendix 4: Environmental and Social Clauses

Appendix 1: Terms of Reference

Société d'Exploitation et de Recherche Minière au Mali (SERM SA)
Faladiè Sema, Street: 841 Door: 202, BP: 366 Bamako (Mali), Tel. (+223) 20 20 60 06 / 79 31 24 67

Terms of reference of the project to exploit the small gold mine of Massala in the rural commune of Baya (Cercle de Sélingué), Bougouni region.

Fixed version

Directed by:

SET Sarl
Headquarters: Bamako - Mali
Tel. 90 27 89 86

March 2025

1. Project Rationale

SERM SA holds the mining title PR 18/952 Sankarani Research Permit, by Order No. 2018-3516/MMP-SG of October 5, 2018, issued for gold and mineral substances of group 2.

The work carried out by SERM SA in the Sankarani exploration permit has yielded encouraging results to be able to undertake the exploitation of a small gold mine there. Indeed, two ore bodies have been distinguished and the evaluated resources are exploitable on a small scale for an estimated period of at least 5 years.

The small Massala gold mine has reserves estimated at 845kg of gold contained in 970,000t of ore at an average grade of 0.87 g/t and a recovery of 75% by gravity, without the use of chemicals. The mine will produce about 100kg per year annually in an ore processing plant with a maximum capacity of 50t/h.

2. Context and justification of the Environmental and Social Impact Study

The carrying out of the Environmental and Social Impact Assessment is mandatory in the Republic of Mali for all activities likely to cause disturbances or modifications to the biophysical and human/socio-economic environment by Decree No. 2018-0991/P-RM of 31 December 2018, relating to the Environmental and Social Impact Study and Notice.

The Massala small-scale gold mine project is classified as a "B" gold mine. It is listed in no. 49 on the list of projects subject to the ESIA (see Appendix to the decree).

3. Objectives of the study:

3.1. Main objective:

The main objective of the study is to provide stakeholders with the information necessary to make decisions on the environmental and social feasibility of the project.

3.2. Specific objectives:

The specific objectives of the ESIA are:

- identify the issues and concerns related to the operation of the small gold mine;
- prevent environmental degradation on the site and in its surroundings;
- assess the impacts of the project on the biophysical and human/socio-economic environments;
- to preserve any cultural sites and ancient objects likely to be found on the perimeter of exploitation;
- to inventory forest resources (flora and fauna);
- propose measures to mitigate and/or compensate for negative impacts;
- to propose support measures for the benefit of the populations in the context of community development;
- to provide security measures on the site and in its surroundings;
- to carry out community mobilization and the organization of public consultation;
- to develop and budget an Environmental and Social Management Plan (ESMP);
- to involve all stakeholders in the public consultation process (administrative and municipal authorities concerned, technical services, surrounding populations, civil society organisations, etc.);

- to draw up a plan for the closure and rehabilitation of the small mine;
- Develop a community development plan.

NB: There will be no expatriate staff mobilized on the site.

4. Expected results:

The expected results of the Study are:

- the biophysical environment is analyzed, environmental concerns and issues are known;
- the human/socio-economic environment is analyzed;
- cultural sites are identified and any ancient objects preserved;
- the legislative, regulatory, policy and institutional framework for environmental protection is described;
- the potential impacts of the project on the environment are known;
- proposals for mitigation and/or compensation measures for negative impacts are made;
- proposals for accompanying measures for the benefit of the population are made in a spirit of community development;
- the inventory of forest resources (flora and fauna) is made;
- security measures were taken for the staff of the small mine and the surrounding populations;
- Stakeholders are informed and involved in the public consultation process.
- the Environmental and Social Management Plan (ESMP) is developed and budgeted;
- the specific social impacts of the project on the surrounding populations are identified and analysed;
- the plan for the closure and rehabilitation of the small mine is drawn up;
- The community development plan is drawn up.

5. Project Location:

The project is located in the Sankarani exploration permit located in the south of Mali in the Yanfolila Geological District. The permit is located in the rural commune of Baya in (Cercle de Sélingué), Bougouni region. It is accessible by the asphalt road Bamako-Bougouni-Yanfolila 240 km and the lateritic road Yanfolila-Siékorolé 40 km.

The site is 9 km from the village of Dalaba.

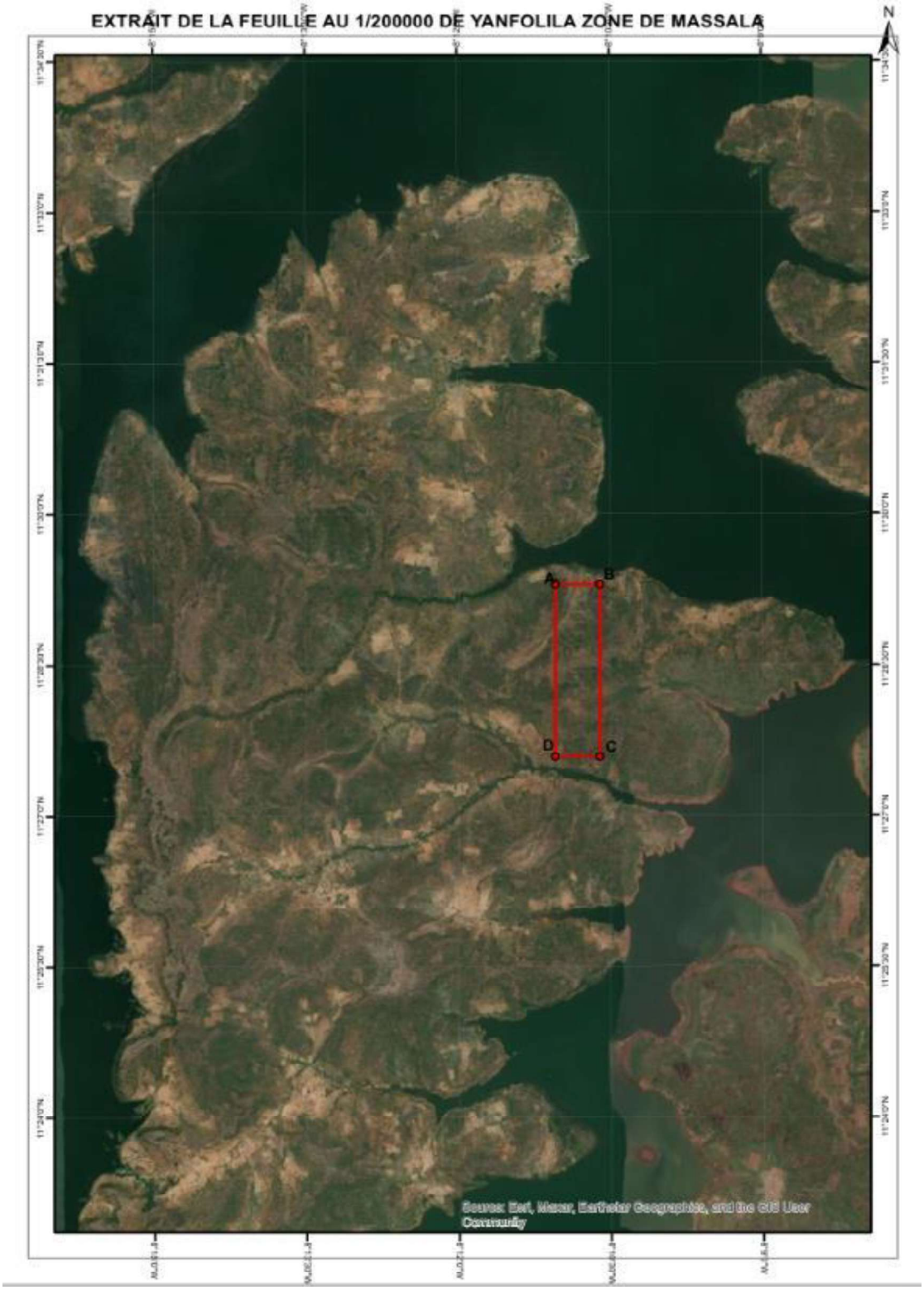
The permit for the small gold mine of Massala has an area of 3 km2. Its contact details are as follows:

Point A: Intersection of the parallel 11° 29' 17.94"N with the meridian 8°11'2.26" W
From point A to point B following the parallel 11° 29' 17.94"N

Point B: Intersection of the parallel 11° 29' ,17.94"N with the meridian 8° 10' 33.15"W
From point B to point C following the meridian 8° 10' 33.15"W

Point C: Intersection of the parallel 11° 27' 34.9" N with the meridian 8° 10' 33.15"W
From point C to point D following the parallel 11° 27' 34.9" N

Point D: Intersection of the parallel 11° 27' 34.9" N with the meridian 8°11'2.26" W
From point D to point A following the meridian 8°11'2.26" W


EXTRAIT DE LA FEUILLE AU 1/200000 DE YANFOLILA ZONE DE MASSALA
N
A
B
C
D
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

6. Missions of the consultant:

6.1. Contacting stakeholders

The consultant will involve all stakeholders in the ESIA process. It will undertake a series of contacts with all the actors concerned by the project:

- the DRACPN/Bougouni;
- the SACPN;
- the governorate of Bougouni;
- the circle of Sélingué;
- the town hall of the rural commune of Baya;
- the decentralised technical services (sanitation, water and forests, health);
- the traditional chieftaincy of the village of Dalaba;
- socio-professional groups in the area;
- and any other actor deemed useful for the proper conduct of the study.

6.2. Delineation of the study area

The consultant will identify the physical boundaries of the study area in the municipality concerned.

6.3. Identification of potential impacts on the biophysical and human/socio-economic environments and key stakeholder concerns

In delineating the study area, the consultant will proceed to identify the potential impacts on the biophysical and human/socio-economic environments and collect the main concerns of the stakeholders.

6.4. Project description

The consultant will describe the main components of the project (the location of the site, the mode of exploitation, the size of the investment, the capacity of the small mine, the equipment used, the activities carried out, the duration of exploitation of the ore, etc.). This description must be detailed in such a way as to allow the assessment of the impacts resulting from each component of the project.

6.5. Description of the initial state of the environment

The consultant will present the basic data on the main environmental characteristics of the study area. It is important to place particular emphasis on changes that may occur during the life of the project. This description will include the following settings: biophysical and human/socioeconomic based on information collected in the field and through documentation.

6.6. Analysis of the legislative, policy and institutional framework

The consultant will ensure compliance with the provisions of the laws and regulations governing the environment in force in Mali, as well as the procedures of good international practices.

The international agreements, conventions, protocols and treaties related to the project to which Mali has acceded must be observed.

6.7. Description of the Method for Identifying and Assessing Impacts

The consultant will describe the method for identifying and assessing the potential impacts of the project. In this chapter, it will highlight the different parameters that contribute to the evaluation of the importance of the impact in relation to each component of the environment.

6.8. Proposal of mitigation and/or compensation measures in relation to the negative impacts of the project on the environment

The consultant will propose mitigation measures to avoid, remedy, or reduce potential adverse impacts to acceptable levels and to consider compensatory measures when mitigation is not feasible. It will also propose support measures for the benefit of the surrounding populations.

Such measures must be technically feasible, economically appropriate and socially acceptable, taking into account the views of all stakeholders.

6.9. Organisation of the public consultation

In accordance with the interministerial order n°2013-256/MEA-MATDAT-SG of 29 January 2013 setting the terms and conditions for the public consultation on environmental and social impact studies, the consultant, in collaboration with the stakeholders, will organise the public consultation under the chairmanship of the administrative authority and to which all the actors mentioned in Article 3 of the interministerial order will be invited. The Minutes and the attendance list of participants will be annexed to the ESIA report.

6.10. Development of the Environmental and Social Management Plan (ESMP)

The consultant will prepare the plan for monitoring and tracking the implementation of impact mitigation measures during the installation, operation and closure of the small mine. It will take into account the costs of implementing and monitoring the measures.

The consultant will present the detailed plan for monitoring the impacts of the project and the implementation of mitigation measures during the installation, operation and closure phases. In particular, it will provide requirements for water retention ponds, waste rock deposits and site reclamation upon closure of the small mine.

It will propose mitigation and/or compensation measures in the event that fully protected species (e.g. shea, locust bean and other species of economic value) and watercourses are negatively impacted by the project.

6.11. Site Security:

To preserve safety on site, the consultant will propose the following measures:

- materialize the boundaries of the small mine (provide a wire fence);
- recruit guards to monitor the site;
- recruit health and safety agents to better take into account health and safety at work;
- install signage for vehicle exits;
- put up signs indicating safety requirements throughout the site;
- display the rules of procedure;
- raise awareness among staff and surrounding populations about the risks of road traffic accidents;
- equip the site with firefighting equipment;
- equipping staff with personal protective equipment (PPE);

- set up an infirmary on the site.

6.12. Protection of cultural sites and ancient objects:

In the event of the discovery of a cultural site or an ancient object in the operating area, the Directorate of Small Mines will inform the competent technical services and follow the procedure in force for the protection of cultural sites and ancient objects.

6.13. Consideration of alternatives to the project

The consultant will examine feasible alternatives to the project based on their environmental impacts. This exercise should focus on the following aspects:

- the location of the factory;
- the location of the quarry and the water retention basin;
- the method of gold extraction;
- access to the site;
- the situation "without a project";
- disposal of waste rock deposits.

6.14. Validation of the ESIA Report

The draft ESIA report and its annexes will be submitted to the DNACPN in fifteen (15) copies. The DNACPN will then make the necessary arrangements to organise the validation workshop by inviting all the technical services concerned by the project and other local actors if necessary. After this workshop, the observations and recommendations are sent to the consultant for consideration before the deposit of the corrected version in five (5) copies in hard copy and one copy on a USB key to the DNACPN.

Appendix 2: Letter of Approval of Terms of Reference

MINISTERE DE L'ENVIRONNEMENT
DE L'ASSAINISSEMENT ET
DU DEVELOPPEMENT DURABLE

SECRETARIAT GENERAL

DIRECTION NATIONALE DE L'ASSAINISSEMENT ET
DU CONTRÔLE DES POLLUTIONS ET DES NUISANCES

REPUBLIQUE DU MALI
Un Peuple - Un But – Une Foi

14 MARS 2025

Bamako, le .....

Le Directeur National de l'Assainissement et
du Contrôle des Pollutions et des Nuisances

0237

Réf n°...../MEADD-DNACPN

A

Monsieur le Directeur de SERM-SA

Objet : Approbation des Termes de Référence du Projet d'exploitation de la petite mine d'or de Massala dans la commune rurale de Baya, cercle de Sélingué, région de Bougouni au compte de la Société d'Exploitation et de Recherche Minière au Mali (SERM-SA).

Monsieur le Directeur,
Suite à votre correspondance relative à l'approbation des Termes de Référence de l'étude du projet cité en objet, à la visite de terrain effectuée le 05 Mars 2025 par une commission technique restreinte conduite par mes services, j'ai l'honneur de vous faire parvenir les observations ci-après :

Constats de terrain : les constats suivants ont été faits :

- Le permis d'exploitation prévu est de 3 km^2 ;
- La visite de terrain a concerné les emplacements de la piste d'accès, de l'usine, de la base vie, des carrières, du bassin de rétention d'eaux usées ;
- Les emplacements indiqués pour les installations respectent les distances réglementaires au fleuve ;
- Le site est bien boisé avec des espèces variées ;
- Il n'y a pas un début d'exécution des travaux, seules quelques tranchées d'exploration existent et sans dégâts environnementaux et sociaux ;
- La réalisation du projet ne nécessitera aucun déplacement de village ou de hameau ;
- La consultation publique a eu lieu sans incident et sans opposition au projet ;
- Les populations et les maires sont enthousiastes à accueillir le projet.

Observations sur les TDRs

Page 1 : Objectifs de l'étude

- Créer la page de garde pour le document et revoir le titre des TDR en faisant ressortir aussi la commune de Baya et son cercle d'appartenance (Sélingué) ;
- Remplacer la dernière puce : ''Remettre en état…à la fin de l'exploitation'' par : Elaborer un plan de fermeture et de réhabilitation de la petite mine ;
- Biffer la puce où il est écrit : Etudier les sites potentiels de recasement des (PAPs), car le consultant a affirmé qu'il n'y aura pas de déplacement de PAPs ;
- Expliquer pourquoi le projet est de catégorie B ;
- Scinder les objectifs de l'étude (Objectif principal et objectifs spécifiques) ;
- Prendre en compte l'inventaire de la faune en plus de l'inventaire des ressources forestières ;
- Prendre en compte l'inventaire de la faune au niveau des résultats attendus ;
- Uniformiser les puces des objectifs spécifiques ;
- Ajouter les points suivants :
  - ✓ Elaborer un plan de développement communautaire.
  - ✓ Elaborer un plan de formation et de remplacement progressif du personnel expatrié par des maliens, s'il y a lieu.

Page 2 : Résultats attendus

- Biffer la 12ème et l'avant dernière puce qui parlent de Plan d'Action de Réinstallation et de site de recasement.
- Remplacer le dernier point par : - Le plan de fermeture et de réhabilitation de la petite mine est élaboré.
- Ajouter :

- Le plan de développement communautaire est élaboré ;
- Le plan de formation et de remplacement progressif du personnel expatrié par des maliens est élaboré, ***s'il y a lieu.***

Page 3 : Localisation du projet

- Préciser les villages les plus proches et leurs distances par rapport au site ;
- Illustrer la partie par une carte de localisation.

Page 3 : Prise de contact avec les parties prenantes

- Remplacer préfecture par cercle.
- Citer les services techniques déconcentrés concernés ;

Page 4 : Délimitation de la Zone d'étude

- Adapter le contenu au titre ;
- En faire un sous-titre, les impacts potentiels sur les milieux biophysique et humains, et les principales préoccupations des parties prenantes.

Page 5, 8.9. Elaboration d'un Plan de Gestion Environnementale et Sociale (PGES)

- Dernière ligne : ajouter bassin de rétention d'eau aux dépôts de stériles.
- Annoncer que les espèces intégralement protégées (karité, Néré et autres espèces de valeur économique) et les cours d'eau seront épargnés et/ou compensés.

Page 5 : Sécurité sur le site

- En plus du recrutement des gardiens, ajouter aussi le recrutement des agents de Santé et de Sécurité pour une meilleure prise en compte de la santé-sécurité au travail.

Page 5 : Examen des alternatives au projet

- **1ères puce :** écrire l'emplacement de l'usine.
- Ajouter l'emplacement des carrières et du bassin de rétention d'eau.

Page 6 : Rédaction du rapport d'EIES

- Remplacer DRACPN par DNACPN, car la validation sera faite à la DNACPN.

Page 7, Annexe

- Ajouter le plan déterminant les emplacements des infrastructures sur le site (les carrières, l'usine, la base de vie et le bassin de rétention).

Recommandations à prendre en compte dans le rapport d'EIES

- Trouver une solution urgente pour protéger les tranchées ouvertes sur le site ;
- Instaurer un système de sécurité pour éviter les cas d'accident de la route ;
- Installer les panneaux de signalisation dans toute les intersections ;
- Nommer un vigil à chaque intersection complexe ;
- Placer le bassin à boue derrière l'usine ;
- Respecter les distances réglementaires entre les installations d'une part, et entre les installations et le fleuve d'autre part ;
- Respecter les routes communautaires qui traversent le permis ;
- Prendre en compte les préoccupations essentielles des populations des communes ;
- Elaborer et mettre en œuvre le Plan d'Opération Interne (POI) en collaboration avec la Direction Générale de la Protection Civile ;
- Former le personnel en secourisme, extinction, sauvetage et déblaiement ;
- Disposer des moyens de secours appropriés et judicieusement repartis (extincteur, PI, RIA etc.) dans les zones à risques ;
- Organiser des exercices de simulation annuelle avec la Direction Générale de la Protection Civile ;
- Solliciter la visite de prévention de la Direction Générale de la Protection Civile ;
- Pour d'autres conseils techniques, s'adresser à la Direction Générale de la Protection Civile ;
- Définir clairement les emplacements des infrastructures (carrières, usine, base de vie et bassin de rétention d'eaux usées) ;
- Mener des études approfondies sur le site du futur bassin de rétention d'eaux usées ;
- Prévoir un système d'étanchéité pendant la mise en place du bassin de rétention ;
- Veiller à l'élaboration d'un plan de développement communautaire consensuel pour les deux communes comme indiqué dans le code minier ;
- Veiller à la mise en place d'un cadre favorable en collaboration avec les deux sous-préfets pour la création du Comité Technique Intercommunal de Suivi du Plan de Développement communautaire ;
- Veiller à l'application de la loi du contenu local ;
- Préciser la superficie du camp minier ;
- Préciser la distance entre l'usine et le camp minier ;
- Préciser la superficie de la carrière ;
- Préciser le nombre de pistes qui seront réalisées pour le transport des minerais ;

- Prendre l'aspect Changements climatiques en compte ;
- Insérer un plan de masse à l'annexe pour rendre visible les différentes installations ;
- Organiser la validation à Bamako et non à Bougouni ;
- Préciser les mesures de bonification, de compensation et d'atténuation pour les impacts potentiels sur les milieux biophysique et humains ;
- Associer le Service des Eaux et Forêts pour les inventaires (Floristiques et fauniques) ;
- Respecter les engagements pris avec les populations ;
- Cartographier les points d'eau et évaluer leur vulnérabilité face aux activités minières.
- Identifier les usages locaux (eau potable, irrigation, élevage) et les besoins des communautés ;
- Effectuer des analyses physico-chimiques et bactériologiques avant le début des activités minières pour établir une base de référence ;
- Mettre en place un plan de suivi régulier de la qualité de l'eau ;
- Prévoir des installations de traitement des eaux usées issues des activités minières.
- Garantir que les eaux rejetées respectent les normes environnementales en vigueur ;
- Définir des périmètres de protection autour des points d'eau (au minimum 500 entre les points d'eau et toutes sources de contamination) ;
- Prévoir des mesures de confinement et de gestion des produits chimiques utilisés pour éviter la pollution ;
- Évaluer les risques de pollution accidentelle (produits chimiques, hydrocarbures) et proposer des mesures de prévention ;
- Élaborer un plan d'urgence pour la gestion des pollutions accidentelles ;
- Impliquer les communautés dans la gestion et la surveillance des ressources en eau ;
- Sensibiliser les populations aux bonnes pratiques de gestion des ressources en eau.
- Réaliser des nouveaux piézomètres sur le site et deux ou trois villages environnants ;
- Faire un programme de suivi des niveaux piézométriques et de la qualité de l'eau ;
- Créer des indicateurs de suivi pour évaluer l'impact des activités sur les ressources en eau ;
- Prévoir des mesures de remise en état des zones impactées (reconstitution des points d'eau détruits et des cours d'eau touchés par les activités minière) ;
- Réaliser une étude hydrographique pour inventorier les cours d'eau (rivières, mares, nappes phréatiques) situés à proximité du site ;
- Évaluer la qualité physico-chimique et bactériologique des eaux souterraines et de surface avant le début des activités pour établir une situation de référence ;
- Mettre en place des périmètres de protection autour des points de captage et des nappes vulnérables ;
- Prévoir des systèmes de drainage et de traitement des eaux usées pour éviter la pollution des eaux souterraines ;
- Prévoir la construction de bassins de décantation pour le traitement des eaux de lavage et des effluents miniers ;
- Mettre en place des dispositifs de recyclage des eaux industrielles ;
- Installer des piézomètres pour surveiller l'évolution du niveau des nappes pendant toute la durée du projet ;

- Effectuer des mesures périodiques pour évaluer les fluctuations saisonnières et l'impact des activités minières ;
- Identifier les sources potentielles de pollution (hydrocarbures, produits chimiques, métaux lourds) ;
- Prévoir des mesures de confinement et de traitement des produits chimiques.
- Intégrer les populations locales dans l'identification des points d'eau stratégiques.
- Prévoir des mécanismes d'indemnisation pour les utilisateurs traditionnels des ressources en eau affectés par l'exploitation ;
- Planifier des projets de réhabilitation des points d'eau affectés ;
- Proposer des systèmes alternatifs d'approvisionnement en eau pour les communautés ;
- Élaborer un plan de suivi des paramètres de qualité des eaux (pH, conductivité, métaux lourds) ;
- Assurer la publication périodique des résultats du suivi pour garantir la transparence.
- Prévoir des actions de réhabilitation des zones exploitées avec restauration des écosystèmes aquatiques ;
- Assurer la remise en état des nappes phréatiques et la destruction sécurisée des installations de drainage ;
- Les recommandations de protection de l'environnement doivent être intégrées dans le Plan de Gestion Environnementale et Sociale (PGES) pour garantir une gestion durable des ressources naturelles tout au long du cycle de vie de la mine.

Une copie des termes de référence corrigés est à retourner à la DNACPN. Lesdits termes de référence sont validés sous réserve de la prise en compte des observations sus mentionnées.

En vous souhaitant bonne réception, veuillez recevoir Monsieur le Directeur, l'expression de mes sentiments de franche collaboration.

P/Le Directeur National P/O
L'Adjoint

Balla SISSOKO

Appendix 3: Public Consultation Minutes

RÉGION DE BOUGOUNI
CERCLE DE SELINGUE
COMMUNE RURALE DE BAYA

REPUBLIQUE DU MALI
UN PEUPLE – UN BUT – UNE FOI

Procès verbal

de la consultation publique sur les enjeux environnementaux et sociaux du projet d'exploitation de la petite mine d'or de Massala, à cheval sur les communes rurales de Baya (Cercle de Selingué) et de Séré Massa Ani Saman (Cercle de Yanfolila), par la Société d'Exploitation et de recherche Minière au Mali (SERM) SA

L'an deux mille vingt cinq et le vingt Mars, s'est tenue dans la salle de réunion de la Mairie de Baya, à partir de 10 heures et 30 minutes la consultation publique sur les enjeux environnementaux et sociaux du projet d'exploitation de la petite mine d'or de Massala, à cheval sur les communes rurales de Baya (Cercle de Selingué) et de Séré Massa Ani Saman (Cercle de Yanfolila) par la Société d'Exploitation et de Recherche Minière au Mali (SERM) SA, sous la présidence de Monsieur Bgabara Kodio, Maire de la Commune rurale de Baya. Le secrétariat de séance était assuré par Monsieur Oumarou Diallo, Secrétaire général de la Commune rurale de Baya.

La consultation publique a enregistré la présence des représentants des services techniques de l'Etat, des autorités communales et villageoises et des représentants de la société civile (voir liste de présence).

Après le mot de bienvenue des chefs de village de Balaba, le maire déclare la séance ouverte.

Bgabara Kodio : la présente rencontre a pour objet

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la tenue de la consultation publique du projet d'
exploitation de la petite mine d'or de Massala.
Après l'ouverture de la séance, un tour de table a
permis la présentation des participants.
Sékou Diarra D.N.A.C.P.N : Nous nous réjouissons
de la présence de tous. Nous avons reçu la demande d'une
société pour l'installation d'une petite mine d'or
à Massala après les recherches qui ont été conduites.
Pour y faire il y a lieu de faire une visite de l'emplacement
avec l'ensemble des parties prenantes et une consultation
publique sur les enjeux environnementaux et sociaux
avant la délivrance de l'autorisation d'exploitation par
le gouvernement conformément à la loi. Après l'intervention
des consultant et de la société, la parole sera donnée
aux uns pour vos interventions.
Marcel Sangaré Consultant : Nous avons été chargé de
mener la consultation pour le projet de petite mine
d'or de Massala. Les recherches ont permis de constater
qu'il y a or dans la zone notamment le côté
Nord qui relève de la commune de Boya et le côté
Sud qui relève de la commune de Sous Massa. Les deux
communes relevaient du cercle de Yanfolila. Mais
Boya relève aujourd'hui du cercle de Bougouni. Du
côté de Boya, c'est le village de Balaba qui est concerné sur
une longueur de 9 Km avec la ville commune de Sous
Massa Avec Sanar. La loi oblige avant exploitation
de tenir une consultation publique sur les enjeux
environnementaux et sociaux, regroupant les services
techniques, les autorités administratives et des collectivités
territoriales, les communautés villageoises pour recueillir
leurs préoccupations. L'exploitation d'une mine
nécessite des excavations sous de grandes envergures
qui impactent l'environnement, l'utilisation de
produits qui impactent également la sécurité

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des populations et des travailleurs de la mine. A cet effet il est important de prévoir des mesures pour atténuer les impacts sociaux et environnementaux. Nous devons recueillir les préoccupations et aspirations des populations de Balaba dans la mise en œuvre de ce projet durant la présente consultation et après.

Pour les travaux, la mine a fortement besoin de main d'œuvre. les compétences locales seront privilégiées sauf lorsque elles n'existent pas.

Conformément au code minier, la Société doit veiller au développement communautaire sur la base du P.D.E.C. Nous avons également appris que Bagoé est en intercommunalité avec Sere Moussa Arr. Sounsan. Cela est une bonne chose et nous aiderons dans la mise en œuvre du développement communautaire. le village de Balaba doit exprimer ses besoin en matière de développement, le genre sera pris en compte et nous veillerons à le prise en compte des besoins des femmes.

la mine fait des excavations pour exploiter extraire et traiter les minerais. Après la fermeture, il est prévu une restauration du site de la mine. Toutes les parties prenantes seront impliquées dans la mise en œuvre du plan de fermeture pour une meilleure restauration et conservation du site. Dans certaines zone, les sites miniers ont été utilisés pour faire la pisciculture. les ~~parties~~ services techniques seront impliqués dans la mise en œuvre du plan de fermeture.

A l'issue de tout ce processus, le gouvernement délivrera le permis d'exploitation. Certaines pensaient que l'exploitation avait déjà commencé. Ce qui n'est pas le cas. Tout sera fait conformément à la réglementation en vigueur.

La durée de la plûtte mine est de cinq (5) ans à partir

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de l'autorisation d'exploitation. Pour le moment nous avons pris des mesures de sécurisation du site pour éviter les occupations anarchiques.
Bédoir Diallo Directeur administratif SERM propose d'aborder dans le même sens et demande à l'assistance d'exprimer ses préoccupations et ses craintes sur le projet.
Sous Lieutenant Abdoulaye Diallo Service Local Eaux et Forêts : je ne connais pas la société qui travaille sur le site. Elle ne nous a jamais associé dans ses concertations. Nous n'avons pas été informé de l'excavation qui a été faite sur le site. C'est à la suite d'une mission à Yanfolila que j'ai eu vent de la présence d'une société dénommée SERM. Toutefois j'ai envoyé une mission sur le site qui a rencontré un certain Sangaré responsable du site. J'aimerais savoir celui qui a fait l'inventaire sur le site.
Marcel Sangaré Consultant : La participation des services techniques à ce processus est très importante. La société c'est SERM SA chargée de l'exploration. Après cette exploration qui s'est révélée concluante, SERM est dans une phase de sollicitation d'une autorisation d'exploitation l'inventaire sera fait dans la phase d'étude en cours. L'inventaire se fera naturellement avec les services techniques le moment venu.
Mamadou Sangaré SERM SA : La superficie de la carrière a été mentionnée par Marcel Sangaré dans son exposé. La carrière n'a pas encore été ouverte. C'est une tranchée qui a été faite pour l'exploration De la 18 à aujourd'hui aucune exploitation n'a été faite. Baye relevait de Yanfolila, Et toutes les autorités administratives de Yanfolila sont informées de notre présence.
Monsieur Sangaré a présenté à l'assistance une cartographie

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du site de la mine et assure que le site est vierge et ne comporte aucune carrière.

Ibrahima Diabaté DNH : A ce stade actuelle la superficie de la carrière ne peut pas être déterminée. Ce sont les études qui le détermineront.

Seydou Barthé DGEF : Notre participation interviendra dans la phase d'exploitation. Je me suis assuré qu'il n'y a pas une forêt classée dans la zone. Le service des eaux et forêts a bien participé dans le processus d'inventaire des ressources forestières et fauniques dans la zone.

Bédian Diallo SEAM : Pendant nos travaux avec les services des eaux et forêts conformément à la réglementation en vigueur le Sous lieutenant Diallo aurait dû nous saisir pour obtenir toutes les informations dont il a besoin. Nous avons obtenu le permis d'exploitation depuis 2018 sous la dénomination Sonbarani. Pour l'exploitation la petite mine sera dénommée "Massalé".

Sékou Diarra DNACPN : J'assure tout le monde que les travaux d'exploitation n'ont pas encore commencé. Dans la phase d'exploration les services techniques ne sont pas impliqués. Leur implication intervient dans la phase des termes de référence et notamment la présente consultation publique et les étapes suivantes.

Amadou Béré chef Secteur Agriculture : Légal sont sera réservé aux bassins qui ne sont pas dans le PDESC? Quelles dispositions pour les périmètres maraîchers?

Marcel Sangaré Consultant : Les autres besoins exprimés par les communautés qui ne sont pas prévus pour le PDESC peuvent être pris en compte. De nouveaux besoins peuvent être exprimés. Dans nos concertations avec les populations et les femmes les besoins ~~des~~ exprimés ~~par~~ devront pris en compte notamment les périmètres maraîchers.

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Seydou Bathé : Un plan de développement communautaire sera élaboré en conformité du PDESC

Marcel Soufaré : Conformément au code minier, un plan de développement communautaire sera élaboré avec l'ensemble des parties prenantes

Habibata Keita 2e Adjoint du maire : Combien de personnes travailleront sur le site de la mine ? Quelle procédure pour la demande d'emploi ?

Marcel Soufaré consultant : Les compétences locales seront privilégiées. Déjà dans la phase de recherche nous avons travaillé avec beaucoup des personnes de la zone. Nous prévoyons la création d'une cinquantaine d'emplois. Pour les emplois qui nécessitent des compétences qui n'existent pas dans la zone, nous serons obligés de les chercher ailleurs. La Mairie peut aider la société dans le processus de recrutement le village aussi peut nous soumettre des demandes d'emploi

Ndebaly Kéré Conseiller communal : Quand sera élaboré le plan de développement communautaire ?

Marcel Soufaré : Nous avons déjà commencé l'élaboration du plan de développement communautaire pour la commune de Sere Mousso Ani Somon. Celui du village de Balaba sera fait bientôt

Safiatou Diarra Conseillère communale : Les femmes feront-elles partie des employés de la mine ?

Marcel Soufaré : Bien sûr que les femmes pourront faire partie des employés de la mine. Nous travaillons déjà avec les femmes

Safiatou Diarra : Il faut veiller au respect du plan de fermeture de la mine.

Seydou Bembele DNGEM : L'étude de faisabilité prévoit la façon dont la restauration du site sera effectuée à travers un plan de fermeture.

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Marcel Sangaré Consultant : La restauration ne consiste pas forcément au remblai du site. Les trous qui ne sont pas trop profondes peuvent être reconvertis en étang piscicole par exemple. Certaines trous peuvent être reboisés.

Sékou Sierra DNACPN : Après l'exploitation, les différentes parties minières décideront à travers une commission de fermeture, du Plan de fermeture du site.

Dawsey Keita DGPC : Des dispositions seront prises par rapport au site après exploitation à travers une clôture par exemple.

Bagbana Kodia, Maire : Je demande à la société de réaliser une part importante de ses infrastructures dans notre commune. Et comment sera effectué la préservation du lac contre les déchets de la mine.

Mamadou Sangaré SERM : L'usine sera construite à Dalaba.

Facoh Doumbia Conseiller de village Dalaba : Le site de la mine appartient à Baya.

Marcel Sangaré Consultant : La carrière n'est pas proche du lac. La base vie et l'usine sont du côté du fleuve. Un bassin de boue sera aménagé pour collecter les eaux dans le respect des distances réglementaires.

Mamadou Sangaré SERM : Lors de la visite de terrain nous avons visité les sites prévus pour l'installation de la base de vie, de l'usine et des bassins de rétention. Le bassin de rétention n'affectera pas le fleuve. Les eaux usées ne sont pas aussi importantes que celles des grandes mines. Il n'y aura pas de produits chimiques dans le bassin de rétention.

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Bagbara Kodio Naire : Nous veillerons à ce que des produits chimiques ne soient pas déversés dans le fleuve à travers un suivi. La confiance n'exclue pas le contrôle.

Drissa Dembele Chef Village Balaba : Je me réjouis de la tenue de la présente rencontre. Si les deux communes étaient présentes nous allions évoquer certains sujets. Mais le moment venu nous en parlerons ultérieurement en ce qui concerne la situation du site.

Amadou Baré Chef Section Agriculture : Je demande à la société de soutenir les agriculteurs car nous sommes dans une zone d'agriculture.

Sous lieutenant Abdoulaye Diallo Eaux et Forêts : Il y a lieu de prévoir un moyen de traverser le fleuve pour faciliter la liaison entre les deux rives.

Maladaly Kané Conseiller communal : Le nom réel de la zone de la mine est "Sobourani" au lieu de "Massala"

Drissa Dembele Chef Village Balaba : Effectivement le nom réel du site est "Sobouraini" et "Bagabalacoura" fait partie de la commune de Baya.

Sékou Diarra DNACPN : Il faut prévoir dès maintenant le nom de la zone avant qu'on franchisse cette étape.

Seydou Dembélé DNGM : Le site est à cheval entre deux communes. Les dénominations peuvent être faite en fonction des coutumes.

Mamadou Sanogo SERM : Nous travaillons conformément à la feuille topo qui mentionne "Massala"

Bréhima Diallo SERM : Ce sont les feuilles topo fournies par la DNGM qui mentionnent ces dénominations. Nous ne pouvons les changer. Le maire peut écrire pour demander la correction des appellations des différents sites.

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Filifing Doumbia Conseiller de village Dolaba : les questions de détermination peuvent être évoquées le moment venu. Je me réjouis de la présence de l'usine et de la base de vie dans le territoire de la commune de Baya.

Drissa Doumbia chef village Dolaba : la dénomination "Dolabolacouran" est erronée. C'est plutôt "Dogabolacouran". Toutefois nous respecterons la loi. Dogabolacouran relève de la commune de Baya et non de Séré Massa Ani Doman.

Sébamba Doumbia Conseiller communal : le maire nous a délégué pour rencontrer le maire de Séré Massa Ani Doman pour discuter de cette situation. Nous nous réjouissons de voir que nos préoccupations ont été prises en compte.

Bagbana Kodio, Maire : je me réjouis de la prise en compte de nos préoccupations dans le mur en cours de projet. La piste peut s'étendre au delà des sites actuels. Je pense que nous avons fait le tour du sujet et nous pouvons mettre fin à la rencontre.

Plus rien n'étant inscrit à l'ordre du jour, le maire déclare close la consultation publique à 13 H 11 mn.

Fait à Kanfara, le 06 Mars 2015

Le Secrétaire de séance

Bagl

Le Président de séance

Bagbana Kodio

RÉGION DE BOUGOUNI

CERCLE DE SELINGUE

COMMUNE RURALE DE BAYA

REPUBLIQUE DU MALI
UN PEUPLE – UN BUT – UNE FOI

LISTE DE PRESENCE

Kangaré, le 06 Mars 2025

Objet : Consultation publique sur les enjeux environnementaux et sociaux du projet d'exploitation de la petite mine d'or de Massala, à cheval sur les communes rurales de Baya (Cercle de Sélingué) et de Séré Moussa Ani Samou (Cercle de Yanfolila), par la Société d'Exploitation et de Recherche Minière au Mali (SERM) SA

N° ordre	PRENOMS ET NOMS	FONCTION	ADRESSE	CONTACT	SIGNATURE
1.	Cgdara Kodio	Maire	Baturu	77575337	
2.	Moussa MAIGA	chef SACON	Yanfolila	75153236	
3.	Ibrahima Diakité	CS/DNH	Bamako	76250511	
4.	Seydou DEMBELE	Agent/DNGM	Bamako	73042577	
5.	Seydou BERTHE	CS/DGEF	Bamako	76946959	
6.	Dawseny Keita	CD/DGPC	Bamako	76885285	
7.	Marcel SANGARE	Environnementaliste SERM SARL	Bamako	76.45.0237	
8.	Béchir Bassi Diallo	Directeur Administratif SERM SA	Bamako	79312467	

9.	Sékou DIARRA	DNACPN	Bamako	76 44 09 68	
10.	Mamadou SANGARE	Géologue Compass Gold	Bamako	76388895	
11.	Sabiatou Diarra	Conseiller communal Baya	Kagaré	79398488	
12.	S/Lt Abdoulaye Diallo	Chef de Service Local des Eaux et Forêts Selingué	Sélingué	75501322	
13.	Amadou BORÉ	Chef service Agriculture	Selingué	76.63.70.62	
14.	Siaka KONATE	Assistant Admi. logistique	SERM	76608973	
15.	Issa Diakité	DNACPN	Bamako	78378071	
16.	Bakary Kone	Représentant jeunesse de dalaba	Dalaba	72325494	
17.	Haroun Doumbia	Représentant jeunesse de Dalaba	Dalaba	79-56-42 49	
18.	Samata Doumbia	Représentante de femme de Dalaba	Dalaba	82 89 67 17	
19.	Avoun Sanata Malabaly Koné	Conseiller Communal	Baya	78-35-90-45	
20.	Mariane Dembélé	chauffeur	sélingué	77422587	
21.	Roy B coulibaly	Geologue	Sie Korolé	76 04 98 38	
22.	Moussa Doumbia	chauffeur - SERM	Bamako	78-49-01-06	
23.	ALi Maïga	Environnementaliste-SERM	Bamako	78.58.32.46	
24.	Mahamed Doumbia	Aide-Documentaliste	Kangaré	78245507	

25.	Oumarou Diallo	Secretaire Général	Lafiabougou	76047978	
26.	Drissa Doumbia	Chef de Village Dalaba	Dalaba	70081348	
27.	Filifing Doumbia	Conseille Village Dalaba-coro	Dalabacoro	94878364	
28.	Sekou Doumbia	Conseiller Communal de Baya	Dalabala	78759368	
29.	Seriba Doumbia	Conseiller de Village Dalaba	Dalaba	90819100	
30.	Seriba Doumbia	Conseiller de Village Dalaba	Dalaba	66966546	
31.	Fako Doumbia	Conseiller de village Dalaba	Dalaba	78308118	
32.	Massaran Camara	Representant de chefs des femmes de Dalaba	Dalaba	96654232	MC
33.	Fatoumata Sacko	3e Vice presidente de femme de Dalaba	Dalaba	52263617	
34.	Fassaman Doumbia	Representant de la jeunesse de Dalaba	Dalaba	61165218	
35.	Massey Sirayoko	Representant de la jeunesse de Dalaba	Dalaba	75804525	
36.	Seydou Camara	President de la jeunesse Dalaba	Dalaba	72295988	
37.	Habib A Keita	Gerant adjoint	Lafiabougou	91206311	
38.	Mamadou Soumano	Bi Selingue	A/e	77.77.91	
39.					
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Appendix 4: Environmental and Social Clauses

These clauses are intended to help SERM SA so that it can integrate them into the documents of prescriptions to optimize the protection of the biophysical and human/socio-economic environments.

1. General:

The company will have to accept and apply the existing laws and regulations on the environment and in force in Mali. In the day-to-day organisation of the work, it must take all appropriate measures to minimise damage to the environment by applying the requirements and ensure that its staff and subcontractors comply with and apply them as well.

1.1. Programme for the implementation of measures:

The company shall draw up and submit to the competent department for approval a detailed environmental and social management programme, including the following information:

❖ **Environmental and Social Management Plan for the site:**

The Environmental and Social Management Plan for the site must include at least:

- the presentation of the project;
- the presentation of the potential impacts related to the project;
- measures to mitigate, compensate and enhance impacts;
- the presentation of the roles and responsibilities of the various stakeholders in the project;
- the organisation chart of the staff assigned to environmental management with an indication of the HSE manager;
- the waste management plan;
- the water and sanitation management plan;
- the plan to combat air pollution;
- the plan to combat noise pollution.

❖ **Site Environmental Protection Plan (PPES):**

The company is required to prepare and submit to the competent department a detailed Site Environmental Protection Plan (PPES) for the installation of the quarry, the factory and the remote site. The ESDP must include at least:

- all the measures for the protection of the site and the implementation programme;
- the location and general plan of the site to scale;
- the reasons for the choice of site;
- the description of methods for avoiding and reducing pollution and fires; traffic accidents;
- regulations concerning environmental protection and safety;
- the provisional plan for the development of the site at the end of the operation.

❖ **Internal regulations:**

The mine management must establish internal regulations mentioning the safety rules, the sensitive elements of the environment surrounding the sites, the dangers of STIs, HIV-AIDS and respect for the habits and customs of the population and human relations in general. The regulations will have to be posted at different places on the site and will appear in the company's vehicles and machines. It confirms the company's commitment to the implementation of the provisions laid down. A presentation of these internal regulations and associated procedures must be made to new employees, as well as to staff already in office, who initial the document before the start of the work. The regulations will cite a list of serious

misconduct giving rise, after recidivism on the part of the offender and despite knowledge of the internal regulations, to immediate dismissal by the company, without prejudice to any legal proceedings initiated by the public authority for non-compliance with the regulations in force:

- drunkenness during working hours, resulting in risks to the safety of staff and the population;
- reprehensible comments and attitudes, sexual harassment;
- violent behaviour;
- wilful damage to the property and interests of others or to the environment;
- repeated negligence or carelessness resulting in damage or harm to the environment, the population and property;
- drug use;
- possession and/or consumption of meat or any other animal or plant part of protected species within the meaning of national legislation;
- Misconduct such as assault and battery, drug trafficking, serious deliberate pollution, trade and/or trafficking in all or part of protected species, will give rise to immediate dismissal as soon as the misconduct is first observed, in accordance with the internal regulations and labour legislation in force.
- the mine management will draw up a form for each serious misconduct, a copy of which will be given to the person concerned, mentioning the measures taken to put an end to the wrongful acts on the part of the person concerned and to draw the attention of other members of the personnel to the type of drift observed. This sheet will be attached to the monthly reports.

1.2. Site Security:

The company will be subject to the special health and safety regimes defined by the regulations in force in Mali. It will organise a routine emergency medical service at the base camp, adapted to the number of its staff. In addition, it will have to have a security team on its staff that will ensure maximum safety at the quarry, the factory and the living quarters, both for the workers and for the population.

1.3. Site Log:

The site log will also include all the records of missing items or accidents that have resulted in a significant impact on the environment or an incident with the population and the recommended corrective measures.

2. Technical requirements:

2.1. On-site kick-off meetings:

The local authorities and the surrounding populations will have to be informed about the consistency of the work that will be carried out and their observations or concerns taken into account. The information on the works will specify the locations likely to be affected and their duration.

2.2. Employment of local labour:

The company is obliged to employ (apart from its technical staff) as many workers as possible in the project area. It will respect, as far as possible, gender equity in the recruitment process. If qualified personnel cannot be found on site, it is authorized to hire labour outside the project area.

2.3. Choice of the site of the factory and the remote site:

The site of the factory and the remote site will have to be chosen in order to limit the felling of trees. It should be chosen outside of sensitive areas.

❖ **Protection of adjacent areas:**

The company will put in place, throughout the duration of the operation, the necessary protective measures so as not to affect vegetation, soil, groundwater, the biological diversity of animal and plant species and natural drainage.
With the exception of the access roads, the boundaries of the sites are marked by a mesh fence. The company will set the boundaries of the infrastructure at a distance of at least 500 m from any permanent watercourse.

❖ **Effluent management:**

No effluent shall be discharged from the small mine into watercourses, soils and water bodies without prior treatment and monitoring of the effectiveness of this treatment ensuring that there is no pollutant load.

❖ **Limiting dust emissions:**

The company will have to implement measures to reduce the dust raised when its vehicles or machines pass over the access tracks, at the level of the quarry and the factory. These abatement measures include regular watering of access roads and work zones, and speed reductions.

❖ **Limitation of noise pollution:**

Noisy work that causes ambient levels to rise by 3 dB more than the nearest off-site reception site is prohibited during off-duty hours.

2.4. Provisions relating to hygiene, cleanliness of the quarry, factory and base camp and pollution prevention:

The relevant provisions will be inserted in the company's internal regulations.
The internal regulations will mention, among other things:

- the prohibition of burying waste on the site;
- the obligation to regularly collect liquid waste from the quarry and the remote site and to dispose of it by appropriate methods used in this area;
- the management of the small mine is required to limit the noise likely to seriously annoy the surrounding populations, either by an excessively long period of time, or by its prolongation outside normal working hours. All noise-causing operations must, before being started, be the subject of an agreement with the HSE manager, with a view to minimising inconvenience to neighbours;
- the execution under supervision of any handling of hazardous substances;
- storage of hazardous substances in leak-proof containers in safe, weatherproof storage areas. Locking storage areas;
- avoid the formation of piles or mounds that impede natural runoff.

2.5. Provisions relating to waste management:

❖ **Limitation of volumes and quantities of waste**:

The generation of waste at source must be reduced by a better choice of implementation techniques and the use of recyclable supplies and goods. Packaging will be controlled and limited in quantity by suppliers.

❖ **Method of collection**:

A waste collection team will be set up and the garbage receptacles will be identified.

2.6. Provisions relating to the protection of vegetation and wildlife:

The company must protect any vegetation that, in the opinion of the HSE manager, does not interfere with activities; clearly mark out the areas to be preserved, particularly the plant formations and ecosystems to be protected, and remove trees only when absolutely necessary. Fires and burning of waste on the site are only permitted with the permission of the HSE manager.

3. Miscellaneous provisions:

Information, raising awareness among staff on the environmental issues of the project, socio-cultural realities, possible risks of accidents and transmission of STIs and HIV-AIDS:

The HSE manager will conduct an information and awareness-raising campaign for the surrounding population and staff throughout the duration of the project. In order to minimize the risk of accidents and various nuisances for the population and wildlife, an internal regulation must specifically mention:

- safety rules;
- the prohibition of hunting;
- respect for the habits and customs of the population and human relations in general;
- and conservation measures against STIs and HIV-AIDS.

The internal rules must be displayed visibly in the various places on the site.

3.1. Security-related provisions:

Safety measures will be taken for the surrounding populations: road signs will be installed along the access tracks, at the crossing areas. Access to the work zones will be forbidden to the population, security guards will monitor the entrances.

3.2. Provisions related to the protection of personnel:

The company must provide its staff with PPE, in particular for workstations:

- to the quarry;
- at the factory.

3.3. Regulations:

The company must apply for the authorizations provided for by the texts and regulations in force and will bear all the related costs.