



ANGOLAN GOVERNMENT
MINISTRY OF AGRICULTURE AND FORESTS
INSTITUTE FOR AGRARIAN DEVELOPMENT



Consultant:



Sub-consultant:



WASTE MANAGEMENT PLAN (PGR)

CPAVCDP-02_24PIU

PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENTS
(AIAS) AND ENVIRONMENTAL AND SOCIAL MANAGEMENT PLANS (PGAS)
FOR THE
AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT
IN EASTERN ANGOLA



CABINDA PROVINCE
AGRICULTURE VALUE CHAINS
DEVELOPMENT PROJECT
(CPAVCDP)



República de Angola
Ministério de Agricultura
e Florestas



TECHNICAL FILE

This document refers to the "Waste Management Plan" (D5.3) of the "Project for the Development of Agricultural Value Chains in the Eastern Region of Angola - CPAVCDP-02_24PIU" within the scope of the two sub-projects, the following documents are to be submitted:

- D1 - Initial report (IR)
- D2 - Complaint Resolution Mechanism (CRM)
- D3 - Stakeholder Involvement Plan (PEPI)
- D4 - Pest Management Plan (PMP)
- D5 - Environmental and Social Impact Assessment (ESIA)
 Environmental and Social Management Plan (ESMP)
Waste Management Plan (WMP)
- D6 - Presentation of Reports
- D7 - Final ESIA and ESMP (including RMP)

DOCUMENT CONTROL

CLIENT	CPAVCDP-02_24PIU
	PROJECT TO DEVELOP THE AGRICULTURAL VALUE CHAIN IN THE EASTERN REGION OF ANGOLA
Sub-project 1.	Rehabilitation of small-scale irrigation systems resistant to climate change. (Lunda Sul)
Subproject 2.	2.1) Construction of a Research Station - Lunda Sul (Instituto Técnico Agrário de Mona Quimbundo) 2.2) Rehabilitation and equipping of a Research Center - Moxico (IDA facilities in Luena) 2.3) Rehabilitation and equipping of a Research Center - Cuando Cubango (Instituto Médio Agrário do Missombo)
DOCUMENT	Waste Management Plan (WMP)
DOCUMENT NO. DOCUMENT	D 5.3
CONSULTANT / SUB-CONSULTANT	ENGCONSULT / ENGIACTIVE

REV.	DATE	ELABORATE D	VERIFIED	APPROVED	GENERAL DESCRIPTION
00	31/01/2025	EE / WD / SB	RL	EB	Waste Management Plan

CONTENTS

1. INTRODUCTION	1
2. OBJECTIVES OF THE PGR.....	2
2.1 SCOPE OF THE WASTE MANAGEMENT PLAN.....	2
2.2 METHODOLOGY FOR DRAWING UP THE WASTE MANAGEMENT PLAN.....	3
2.3 WASTE MANAGEMENT POLICY	3
3. ROLES AND RESPONSIBILITIES.....	4
3.1 CONSTRUCTION PHASE	4
3.1.1 Contractor(s) and subcontractor(s) involved in the construction process	4
3.1.2 Contractor's Environmental Specialist (EO) or designated staff member	4
3.1.3 Supervision (Environment Manager)	4
3.1.4 The promoter	5
4. LEGAL FRAMEWORK.....	1
4.1 WASTE MANAGEMENT REGULATION	1
4.2 STRATEGIC URBAN WASTE MANAGEMENT PLAN.....	1
4.3 ADMINISTRATIVE OFFENSES LAW	1
4.4 APPLICABLE BAD/IFC NOTES	2
5. CONSTRUCTION SITE WASTE MANAGEMENT.....	1
5.1 SOLID WASTE MANAGEMENT STRATEGY	1
5.2 CLASSIFICATION AND CATEGORIZATION OF WASTE.....	1
5.3 SITE WASTE MANAGEMENT PROCEDURE.....	2
5.4 CLEANING, IDENTIFICATION, SEGREGATION, STORAGE, COLLECTION, TRANSPORTATION AND FINAL DESTINATION	3
5.4.1 Identification	3
5.4.2 Segregation phase	4
5.4.3 Temporary storage.....	4
5.4.4 Waste Reuse, Recycling and Recovery.....	5
5.4.5 Waste Collection, Transportation and Final Destination	5
5.4.6 Atmospheric emissions management.....	10
5.4.7 Quality assurance and continuous improvement	10
6. ACTIVITIES	11
7. ESTIMATING WASTE AND WASTEWATER	12
7.1 CONSTRUCTION PHASE	12
7.2 OPERATION PHASE	15

8. SOLID WASTE AND WASTEWATER MANAGEMENT	17
8.1 CONSTRUCTION PHASE	17
8.1.1 Waste management	17
8.1.2 Management of waste storage areas.....	17
8.1.3 Disposal management	18
8.1.4 Registration	18
8.2 OPERATION PHASE	18
9. MONITORING PLAN	19
9.1 CONSTRUCTION PHASE	19
9.2 OPERATION PHASE	19
10. AUDITS AND INSPECTIONS	19
11. REPORT	21
12. DECOMMISSIONING OF THE SITE.....	22

LIST OF TABLES

Table 1 - List of hazardous waste characteristics	1
Table 2 - Identification of hazardous waste	2
Table 3 - Inventory of construction site waste.....	7
Table 4 - Construction waste.....	12
Table 5 - Estimated category and quantity of solid waste and wastewater to be generated during the construction phase of the prison.	13
Table 6 - Waste from the operation.....	15
Table 7 - Monitoring plan for the construction phase.	19
Table 8 - Monitoring plan for the operation phase.	19

LIST OF FIGURES

FIG. 1 - Container model to be installed at strategic locations on the site.....	4
FIG. 2 - Type of metal bucket to be installed.	5

LIST OF ACRONYMS

ACRONYM	DESCRIPTION
PGR	Waste Management Plan
IFC	International Finance Corporation
BAD	African Development Bank

1. INTRODUCTION

Two sub-projects will be implemented as part of the Development of the Agricultural Value Chain in the Eastern Region of Angola project:

1. Rehabilitation of climate-resistant small-scale irrigation systems. Lunda Sul - Pelengue Canal and Capuepua Canal
2. Rehabilitation and Equipping of two Research Centers . Construction of a Research Station. Lunda Sul | Moxico | Cuando Cubango
 - 2.1-a) Rehabilitation and Equipping of a Research Center - Mona Quimbundo Agrarian Technical Institute
 - 2.1-b) Rehabilitation and Equipping of a Research Center. Cuando Cubango - Middle Agrarian Institute of Missombo
 - 2.2) Construction of a Research Station. Moxico - IDA facilities in Luena

The aim of these projects is to improve food and nutrition security, family income and employment in the provinces of Lunda Sul, Moxico and Cuando Cubango.

2. OBJECTIVES OF THE PGR

The Waste Management Plan (WMP) plays a key role in achieving sustainable waste management at all stages of the project.

The main aim of this RMP is to plan the waste management activities to be carried out for the project. It also aims to identify good waste management practices that can be implemented throughout the perimeter of the site from an environmentally sustainable perspective.

The RMP seeks to promote a sustainable environment in order to reduce the production of waste from its source, to develop adequate segregation at source, to identify and store waste correctly, to control potential environmental and health risks, and to ensure the best planning and management in accordance with the legislation in force in the country and best practices. However, taking into account the size and nature of the project, the main objectives of this RMP can be summarized as follows:

- Ensure the prevention of environmental pollution associated with the production of waste in the different operations carried out at the Shipyard during the construction of the Irrigation Systems Rehabilitation project in Lunda Sul and the rehabilitation of the Research Centers in Lunda Sul and Cuando-Cubango and the construction of a new Research Center (Moxico);
- Ensuring compliance with the legal requirements in force in the Republic of Angola and with internationally recognized good environmental practices on waste management in this type of activity (construction sector);
- Present the different types and quantities of waste generated during the construction phase of the shipyard and during the construction of the prison and other support facilities;
- Present options for preventing potential environmental and civil liability risks resulting from inadequate waste management;
- Present the possible ways of treating and recovering the waste produced;
- Present ways to promote the implementation of the principles of the six (6) R's, namely: Rethink, Refuse, Reduce, Reuse, Repair, Recycle.

2.1 SCOPE OF THE WASTE MANAGEMENT PLAN

This RMP applies to all activities to be carried out in the workplace.

It must be complied with by employees, managers, visitors, clients, service providers and any users of the Base's infrastructures, as applicable to them. Surrounding communities and projects are excluded from the scope of this RMP.

2.2 METHODOLOGY FOR DRAWING UP THE WASTE MANAGEMENT PLAN

This plan was drawn up on the basis of the methodological assumptions set out in Presidential Decree 190/12 of August 24, as well as consultation with the various public administration bodies in the provinces of Lunda Sul, Moxico and Cuando Cubango. Interviews were also conducted with community administrators and Sobas. The interviews were based on previously prepared surveys, covering the following aspects:

- Identification of waste management services in the region, identifying the operating methods and constraints at all stages of the process: packaging, cleaning, transportation, treatment and final disposal of the waste produced;
- Identified management models underway in the municipalities of Saurimo, Moxico and Menongue (non-existent in the project area) or suitable and efficient alternative models to guarantee the quality of the waste management service;
- Characterization of the waste produced during the construction of the Irrigation Systems Rehabilitation project in Lunda Sul and the requalification of the existing Research Centres (Lunda Sul and Cuando-Cubango) and construction of a new Research Centre (Moxico) in quantity and quality (industrial, domestic, commercial waste, etc.) and proposals for alternative forms of appropriate treatment, as appropriate.

2.3 WASTE MANAGEMENT POLICY

The Waste Management Plan for the Shipyard and the Rehabilitation of Irrigation Systems in Lunda Sul and the requalification of the existing Research Centers (Lunda Sul and Cuando-Cubango) and the construction of a new Research Center (Moxico), is based on a commitment to environmental and business sustainability, and will follow the process of continuous improvement through the supervision and verification of all the processes that involve the plan itself.

3. ROLES AND RESPONSIBILITIES

As far as responsibility for implementing this Waste Management Plan is concerned, all entities (Contractor, Developer, Supervision, Owner and Institutional Entities) have responsibilities in the different phases of the project's implementation.

3.1 CONSTRUCTION PHASE

3.1.1 Contractor(s) and subcontractor(s) involved in the construction process

They are responsible for drawing up and implementing the RMP, given the need to collect, store, recycle, reuse and dispose of all solid waste and wastewater produced on the site and on construction sites.

3.1.2 Contractor's Environmental Specialist (EO) or designated staff member

It must develop, implement and maintain a waste inventory that reflects all waste generated during construction, for both general and hazardous waste streams. You are responsible for ensuring strict compliance with applicable legislation and regulations in the implementation of the project, its execution and its monitoring.

The technicians appointed by the Contractor will be responsible for providing training and information on each worker's responsibilities with regard to waste and wastewater management. The training will have the following objectives:

- Keep internal waste storage areas clean, tidy, free of insects, unpleasant odors or debris;
- Keep septic tanks covered and portable toilets clean and carry out regular maintenance;
- Inform about the risks of potential oil and fuel spills;
- Present the correct way to store waste; and
- Encourage the recovery of waste produced and separate and store waste in designated places.

3.1.3 Supervision (Environment Manager)

It is responsible for monitoring the implementation of the RMP.

3.1.4 The promoter

It is responsible for verifying compliance with the regulations of the funder, as well as all those of the international forum, transposed and recognized in the country where the work will be carried out.

The Contractor and his subcontractors and the technical teams they appoint (for cleaning, collecting and storing waste) will be responsible for applying the principles and guidelines of the Waste Management Plan (cleaning, internal collection, internal transportation, treatment or recovery and final disposal of the waste produced) and will regularly have the duty to:

- Respect and enforce the legislation on the collection, transportation, treatment and final disposal of waste produced within the scope of the project;
- Respect and enforce legislation on water quality and the regulation of public water supply and wastewater disposal;
- Being responsible for the disposal of waste and assisting the staff with the general cleaning and organization of the site, as well as valuing for correct discrimination and packaging of waste;
- To be responsible for training the employees involved in waste management, so that they can acquire the knowledge to carry out the principles of waste reduction, reuse, repair and recycling in all the activities carried out on site during the construction of the prison;
- Being responsible for giving talks on solid waste management, so that all the company's workers have basic knowledge of how to separate waste according to its characteristics;
- Developing, promoting and supporting environmental awareness and education programs among administrative managers, employees, clients, suppliers, service providers and any visitors.

4. LEGAL FRAMEWORK

The Waste Management Plan for the Rehabilitation of Irrigation Systems in Lunda Sul and the upgrading of the Research Centers in Lunda Sul and Cuando-Cubango and the construction of a new Research Center (Moxico) was carried out in accordance with the environmental legislation in force in the Republic of Angola regarding waste management and other good practices.

4.1 WASTE MANAGEMENT REGULATION

The legal basis for this document is Presidential Decree 190/12 of August 24 (Waste Management Regulations). According to Article 6 of this decree, the assessment of hazardous and non-hazardous waste management plans is the responsibility of the Ministry of the Environment.

Article 7 establishes that all public or private entities that produce waste or carry out activities related to waste management must prepare a Waste Management Plan (WMP) before starting their activities, containing at least all the precise information listed in Annexes I and/or II.

Article 7(3) states that the RMP is valid for a period of 4 (four) years from the date of its approval. The RMP referred to in the previous paragraph must be updated and submitted to the Minister for the Environment (National Waste Agency) at least 90 days before it expires, and whenever there are substantial changes to the plan submitted (Article 7, point 4).

4.2 STRATEGIC URBAN WASTE MANAGEMENT PLAN

This RMP is in line with what is described in the Strategic Plan for Urban Waste Management (PESGRU) (Presidential Decree no. 196/12). The PESGRU is a national reference instrument for waste management in the industrial sector, which establishes a new philosophy for waste management in Angola. The strategic axes defined in PESGRU, which are important for waste management, include specific guidelines for selective collection, recycling and reuse, treatment, disposal and recovery of waste, training and awareness-raising, among others.

4.3 ADMINISTRATIVE OFFENSES LAW

The Administrative Offenses Law (Law no. 12/11, of February 16) establishes the general bases applicable to administrative offenses committed individually or collectively by citizens or public or private legal persons.

Article 10 considers offenses against hygiene and public health to include the disposal of solid waste outside the places or times determined for this purpose, the disposal, storage or piling up of waste,

wastewater, polluting products or other waste of the same or similar nature on public roads, rivers, beaches, territorial waters, inland gardens and other inappropriate places, among others.

Natural or legal persons who, by action or omission, commit administrative offenses are subject to the payment of fines (Article 11).

Management of waste generated by the construction, demolition and collapse of buildings (Executive Decree 17/13, of February 22) :

- The legal framework for the management of waste resulting from the construction or demolition of buildings or landslides, abbreviated to CDW, covers its prevention and reuse and the operations of collection, transportation, storage, sorting, treatment, recovery and disposal in an environmentally correct manner;
- Article 3 establishes that management is the responsibility of all those involved in its life cycle, from the original product to the waste produced, in terms of their intervention, in accordance with the provisions of this Executive Decree.

4.4 APPLICABLE BAD/IFC NOTES

All the ADB/IFC guidance notes form the basis of the project standards.

- ADB and IFC Performance Standards on Social and Environmental Sustainability;
- IFC General Guidelines on Environment, Health and Safety (EHS);
- IFC EHS guidelines for construction and dismantling;
- IFC EHS Guidelines for the Occupational Health and Safety of Waste Management Facilities.

These guidelines contain performance levels and measures that are generally accepted by the IFC and that are generally considered achievable at reasonable cost by existing technology.

5. CONSTRUCTION SITE WASTE MANAGEMENT

5.1 SOLID WASTE MANAGEMENT STRATEGY

Sustainable municipal solid waste strategies are combinations of different procedures to be taken into account in the municipal solid waste treatment process through integrated solid waste management principles. The analysis of the outcome of these procedures aims to influence the next steps to be taken in order to continuously improve the waste management and minimization chain.

5.2 CLASSIFICATION AND CATEGORIZATION OF WASTE

Solid waste is classified according to its characteristics or properties. Classification is relevant to the choice of environmentally appropriate disposal. Waste can be classified according to its physical nature, chemical composition, potential risks to the environment and origin.

Taking into account the legislation in force, in its article 4 (Presidential Decree no. 190/12), the waste that may be produced during the construction of the Shipyard and the Rehabilitation of Irrigation Systems in Lunda Sul and the requalification of the existing Research Centers (Lunda Sul and Cuando-Cubango) and the construction of a new Research Center (Moxico) can be classified as hazardous or non-hazardous. Non-hazardous waste includes the following:

- a) Paper, cardboard, plastics and packaging;
- b) Glass, metal, wood, ferrous and non-ferrous scrap metal;
- c) Organic matter (food waste, etc.);
- d) Pallets, containers for hydraulic oils, fuels and chemical solvents;
- e) Among other types, as long as they do not have hazardous characteristics. Hazardous waste is described as all waste that has any hazardous characteristics, so here are some examples of the types of hazardous waste that are in evidence in the construction industry.



Table1 - List of Hazardous Waste characteristics.

FEATURES
Substances consisting of compressed gases liquefied or under pressure: Gases that are dangerous because they are compressed, liquefied, dissolved under pressure or refrigerated. These gases can present an additional risk and can be asphyxiating, such as nitrogen, flammable, such as butane, or toxic, such as chlorides.
Flammable: Flammable liquids are liquids, mixtures of liquids or liquids containing solids in solution or suspension (e.g. paints, varnishes, lacquers, etc., not including substances or wastes otherwise classified because of their hazardous characteristics) that give off flammable vapors at temperatures not exceeding 60.5° C for the open container test or not exceeding 65.6° C for the closed container test. Since the results of open cup and closed cup tests are not strictly comparable and the results obtained by the same method often vary, regulations which depart from the above values to take account of these differences are considered compatible with the spirit of this definition.

In order to guarantee the preservation of the environment and safety at the Shipyard, the model for the identification, sorting, segregation, storage, treatment and final disposal of hazardous waste will

be considered in accordance with the recommendations of Annex V of Presidential Decree no. 190/12 of August 24, as illustrated in Table 2

Table 2 - Identification of Hazardous Waste

TYPE OF WASTE	IDENTIFICATION METHOD	TYPE OF LABEL
Gases Liquefied or pressurized tablets	Containers must be clearly identified by a white or black label with a green background, placed on all sides as an international symbol for substances consisting of liquefied or pressurized compressed gases.	
Flammable liquids	Containers must be clearly identified by a black label with a red background, placed on all sides as the international symbol for substances consisting of flammable liquids.	

Source: Presidential Decree no. 190/12, of August 24.

Regarding categorization, the waste that can be produced at the Shipyard is included in the Angolan Waste List (LAR), presented in Presidential Decree no. 190/12, as:

- (14) Used oils and liquid fuel waste (except edible oils);
- (16) Packaging waste; absorbents, wiping cloths, filter materials and protective clothing not otherwise specified;
- (17) Wastes not specified on the list;
- (21) Municipal waste (household waste and similar commercial, industrial and institutional waste), including separately collected fractions.

5.3 SITE WASTE MANAGEMENT PROCEDURE

During the construction activities carried out at the shipyard, the main waste produced is:

- Municipal and similar waste, including selectively collected fractions such as: food waste, paper, cardboard, plastics, glass, packaging, wood, ferrous and non-ferrous metals, edible oils and fats, fluorescent lamps, used detergent packaging, batteries and accumulators, cleaning waste from facilities (inert), used uniforms, etc.
- Waste from sanitary facilities, such as black wastewater and soapy water, used toilet paper, gel containers for hand washing, etc.
- Health service waste resulting from the use of the first aid kit, for medical assistance and medication (first aid).
- Waste oils and liquid fuels from the workshop and vehicle refueling area, such as: hydraulic oils used in generators and motor vehicles, oil and water separator contents, oil and water separator sludge, gasoline and diesel used to wash vehicle parts, etc.

- Packaging waste; absorbents, cleaning cloths, filter materials and workers' personal protective clothing.
- Unspecified waste, such as: vehicle maintenance waste, used tires, oil filters, batteries, brake pads, brake fluids, waste from damaged electrical and electronic equipment, transformers and capacitors, concrete waste, etc.

In terms of category, the hazardous waste produced by the shipyard is Class I, namely: packaging of chemical solvents, used hydraulic oils, brake fluids, brake pads, packaging of chemical products, similar waste from health services, batteries, fluorescent lamps and other parts or pieces of motor vehicles and sanitary effluents.

Thus, the implementation of the principles and guidelines of the Waste Management Plan (WMP) is essentially aimed at stimulating environmental preservation. At the shipyard, the main stimulator of this plan will be the application of the waste management hierarchy concept, presented below:

- Rethink - Rethink production habits (avoid excessive production of solid waste and the like);
- Repair - Repair faults in the machinery, equipment and motorized vehicles that support the Platform, in order to avoid generating different types of waste;
- Reduce - Reduce waste production as much as possible;
- Reuse - Reuse as much as possible before throwing away;
- Recycle - Recycle materials as much as possible;
- Refuse - Refuse products that harm the environment and public health.

In order to apply this sequence sustainably, the Contractor and his subcontractors must persuade all workers to investigate viable alternatives to improve the proper sorting, separation, treatment, recovery and disposal of waste.

To achieve this, environmental education training could be given, leaflets produced and environmental awareness panels installed.

5.4 CLEANING, IDENTIFICATION, SEGREGATION, STORAGE, COLLECTION, TRANSPORTATION AND FINAL DESTINATION

Cleaning and waste collection services at the site will be carried out by an internal site team, managed by the Contractor and its subcontractors.

5.4.1 Identification

In order to guarantee the industrial safety of the Shipyard, as well as the health and well-being of all workers, waste will henceforth be treated according to its classification. Hazardous waste or waste harmful to public health will be clearly identified by placing a label on all sides of the container with the international symbol for hazardous substances, as illustrated in Table 2. At this stage, the legal provisions set out in Annex IV of Presidential Decree 190/12 will always be complied with.

5.4.2 Segregation phase

The shipyard's waste will initially be segregated at the time and place of its production, according to its physical, chemical and biological characteristics, its physical state and the potential risks involved. This process will be carried out on a daily basis at all waste-producing facilities, including the administrative area (offices). In order to guarantee correct segregation of the waste produced, employees will be made aware of this through environmental education panels and training on waste management and health and safety at work.

Segregation will be introduced to encourage the selective collection or recovery of waste. This measure will aim to:

- Keep waste storage areas clean, tidy, free of insects, unpleasant odors or debris;
- Prevent or control any spills;
- Store hazardous waste separately from non-hazardous waste; and
- Encourage waste recovery.

5.4.3 Temporary storage

In order to guarantee the organization of the Yard, waste similar to household waste (paper, cardboard, glass, packaging, metal, food waste, various plastics, etc.) and office waste (except ink cartridges) will be stored in sturdy, waterproof containers (black or white bags) and then deposited in conventional containers equipped with a 1,000-litre manual lid with the inscription shown in the figure below.

The bins will be placed in strategic locations to encourage waste disposal.

The containers to be installed will preferably be made of washable material, resistant to puncture, breakage and leakage, with a lid fitted with a manual opening system for storing the facility's non-hazardous waste (see figure below).



FIG.1 - Container model to be installed in strategic locations on the site.

The waste from pallets, various types of wood, packaging, ferrous and non-ferrous metals will initially be packed in stationary metal containers (metal buckets), made from stainless steel sheeting (see

figure below) and stored in an appropriate place, protected from the sun and rain, to ensure safety and minimize the impact on the environment.



FIG.2 - Type of metal bucket to be installed.

The remains of PPE (safety boots, goggles, gloves and damaged helmets, etc.), hydraulic oil and fuel drums, used tires, oil filters, batteries, brake pads, brake fluids, damaged electrical and electronic equipment, transformers and capacitors and damaged vehicle parts, as they are classified as hazardous waste, will be packed in specific containers resistant to normal transport operations and stored in a specific area for hazardous waste. Others can be sterilized (e.g. oil and fuel drums) and reused in the base's day-to-day operations.

5.4.4 Waste Reuse, Recycling and Recovery

The Contractor and its subcontractors will be focused on implementing good environmental management practices in order to prioritize the reuse, recycling and recovery of waste. With this in mind, used tires, hydraulic oils and brake fluids used in generators and vehicles will be sent to specific companies for treatment.

5.4.5 Waste Collection, Transportation and Final Destination

The waste stored at the Shipyard will be collected daily by a licensed company and transported in compactor vehicles with a capacity of 16 m³ to the sanitary landfill or controlled landfill authorized by the municipal administration.

The waste collected and transported will be subject to the completion of a waste transport note. The loading and unloading of waste transportation vehicles will be the responsibility of the Contractor and his subcontractors.

In accordance with Presidential Decree No. 190/12, the Contractor and his subcontractors must send a copy of the transport note to the Ministry of the Environment (National Waste Agency) and another copy must be kept at his office for five (5) years.

Waste must be transported under environmentally appropriate conditions, in such a way as to avoid its dispersal or overflow, and in compliance with the following requirements, without prejudice to other conditions, namely:

- Liquid waste will be stored in covered containers, the fill rate of which will not exceed 98%;
- All the waste will be properly stored in the vehicle and secured in such a way as to avoid any movement between them or against the walls of the vehicle;
- When any overflow occurs during loading, travel or unloading, the area will be cleaned immediately, using absorbent products when liquid waste is involved;
- Containers made of materials that do not react with the waste deposited in them or that have a suitable coating will be used.

Inventory of shipyard waste - Construction of the Irrigation Systems Rehabilitation project in Lunda Sul and the requalification of the existing Research Centers (Lunda Sul and Cuando-Cubango) and construction of a new Research Center (Moxico).

The types and volumes of waste that are generated during the operation of the Shipyard and the respective daily estimates are based on approximate quantities, as illustrated in Table 3

Table3 - Inventory of construction site waste.

WASTE	CLASSIFICATION	CHARACTERIZATION ACCORDING TO PRESIDENTIAL DECREE 190/12	QUANTITIES GENERATED (PER WEEK)	APPLICABLE RECOMMENDATION	TEMPORARY STORAGE (COLOR CODE)	RECOMMENDED FINAL DISPOSAL MEASURES
Household and equivalent waste						
Organic (food waste)	Non-hazardous waste	Domestic solid waste	-	Composting	Containers	Landfill or controlled landfill (indicated by the administration)
Paper (office: magazines, newspapers, personal hygiene)	Non-hazardous waste	Domestic solid waste	-	Recycling, sorting and shredding	Containers	Reuse when possible Landfill or controlled landfill (indicated by the administration)
Card (boxes and crates)	Non-hazardous waste	Domestic or industrial solid waste	-	Sorting and recycling	Container / Suitable strategic location on site	Reuse / delivery to collectors Sanitary or controlled landfill Marketing to the local population
Plastics (bags, plastics and non- contaminated plastic packaging)	Non-hazardous waste	Industrial solid waste	-	Selection / Washing	Container / Suitable strategic location on site	Reuse / delivery to collectors Sanitary or controlled landfill Marketing to the local population
Glass (fluorescent lamps and others)	Non-hazardous waste	Mercury and its compounds	-	Correct packaging at the factory	Specific closed containers	Reuse / delivery to collectors Sanitary or controlled landfill Marketing to the local population
Spa effluent (bathrooms)	Other waste not otherwise specified	Domestic waste	10.000L	WASTEWATER TREATMENT PLANT - ETAR	Septic tank	Dump in a place authorized by the Municipal Administration

WASTE	CLASSIFICATION	CHARACTERIZATION ACCORDING TO PRESIDENTIAL DECREE 190/12	QUANTITIES GENERATED (PER WEEK)	APPLICABLE RECOMMENDATION	TEMPORARY STORAGE (COLOR CODE)	RECOMMENDED FINAL DISPOSAL MEASURES
Industrial waste						
Drums and drums of solvents, bases, toxic and corrosive chemicals	Dangerous	Industrial waste	-	Selection, washing and repair	Specific area signposted for different types of waste and paved	Reuse / delivery to collectors Marketing to the local population after washing.
5 and 25 liter drums	Dangerous / Not dangerous	Industrial waste	-	Selection and washing	Specific and signposted area	Reuse and Recycling at the Shipyard
Contaminated rags (dirty cleaning cloths used at the shipyard)	Hazardous waste	Special waste	-	Selection and washing	Specific location / Container	Reuse when possible Landfill or controlled landfill (indicated by the administration)
Damaged pallets and leftover formwork timber	Not dangerous	Industrial waste	-	Sorting, repair	Suitable location at the shipyard	Reuse at the Shipyard Donation or sale to the local population
Effluent from washing the gutters of tanker trucks, drums and drums	Dangerous	Industrial waste	-	WASTEWATER TREATMENT PLANT - ETAR	Concrete waste retention basin	Dump in a place authorized by the Municipal Administration
Used oils and liquid fuel waste (vehicle/equipment maintenance)	Hazardous / flammable waste	Industrial waste	15L	Retention basin	Holding tank	Delivery to collectors
Waste electrical and electronic equipment						

WASTE	CLASSIFICATION	CHARACTERIZATION ACCORDING TO PRESIDENTIAL DECREE 190/12	QUANTITIES GENERATED (PER WEEK)	APPLICABLE RECOMMENDATION	TEMPORARY STORAGE (COLOR CODE)	RECOMMENDED FINAL DISPOSAL MEASURES
Damaged computers, Damaged printers, Ink cartridges and other equipment.	Hazardous waste	Special waste	-	Repairs	Containers	Repair or Recycling Landfill or controlled landfill (indicated by the administration)
Hospital waste						
Sharps and infected material (needles, bandages)	Hazardous waste	Hospital waste	-	Packed in bags Handle with care to avoid spills or tears Pick up the top when lifted, and always wear gloves when handling the bags.	Containers	Incineration

5.4.6 Atmospheric emissions management

The Contractor and his subcontractors must ensure that all the equipment, machinery, generators and motor vehicles used in the construction of the Rehabilitation of Irrigation Systems in Lunda Sul project and the upgrading of the existing Research Centers (Lunda Sul and Cuando-Cubango) and the construction of a new Research Center (Moxico) are in perfect working order, regulated and with the filtering equipment in excellent working order, and are subject to periodic overhauls in order to comply with the manufacturers' recommendations for use and the required parameters.

5.4.7 Quality assurance and continuous improvement

During the normal operation of the site, the Contractor and its subcontractors will periodically carry out internal waste management audits and occasional assessments, as well as monitoring compliance with the RMP. These evaluations will allow indicators to be obtained which will inform about possible deviations from the RMP. After the evaluation, if necessary, precautionary and preventive actions will be established and included in the RMP.

6. ACTIVITIES

The main construction activities for this project are:

- Clearing and deforestation of the areas to be treated
- Installation of pumping stations, hydrants, valves, etc. and related concrete works
- Earthworks for the new building in Moxico
- Shallow excavations for buried networks
- Foundations
- Structure
- Boxes and covers
- Masonry, finishing, locksmithing
- Mechanical, electrical, communication, fire protection, mechanical and electrical installations
- Security and communication networks and systems
- Commissioning and provisional start-up/delivery

In the operation phase, it will be considered:

- Activities associated with the operation of infrastructures
- Traffic generated by the operation of infrastructures
- Infrastructure maintenance
- Waste generation, storage and transportation of agricultural inputs and products

7. ESTIMATING WASTE AND WASTEWATER

7.1 CONSTRUCTION PHASE

During the construction phase, the potential waste associated with the execution of the works, which has the following main typologies according to the European Waste Codes (EWC), is as follows:

Table4 - Construction waste

CODE	SOLID WASTE
08 01 11 (*)	Waste paints and varnishes containing organic solvents or other dangerous substances
08 01 12 (*)	Waste paint and varnish other than those mentioned in 08 01 11
08 03 18	Waste printing toner other than those mentioned in 08 03 17
13 02 06 (*)	Synthetic oils for engines, gears and lubricants
15.01 01	Paper and cardboard packaging
15.01 02	Plastic packaging
15.01 03	Wooden packaging
15.01 04	Metal packaging
15.01 05	Composite packaging
15.01 06	Mixed packaging
15.01 07	Glass packaging
15.01 08	Textile packaging
15.02 03	Absorbents, filter materials, cleaning cloths and protective clothing not covered by 15 02 02.
16.01 03	Used tires
16 06	Batteries and accumulators
16 01 07 (*)	Oil filters
17 01 01	Concrete
17 01 02	Bricks
17 01 03	Tiles and ceramic materials
17 01 06 (*)	Mixtures or separate fractions of concrete, bricks, tiles and ceramic materials containing dangerous substances
17 01 07	Mixed concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06
17 02 01	Madeira
17 02 02	Glass
17 02 03	Plastic
17 02 04 (*)	Glass, plastic and wood containing or contaminated with hazardous substances
17 03 01 (*)	Bituminous mixtures containing tar
17 03 02	Bituminous mixtures other than those mentioned in 17 03 01
17 03 03 (*)	Tar and tar products
17 04	Metals (including alloys)
17 04 01	Copper, bronze and brass
17 04 02	Aluminum

CODE	SOLID WASTE
17 04 03	Lead
17 04 04	Zinc
17 04 05	Iron and steel
17 04 06	Can
17 04 07	Mixing metals
17 04 09 (*)	Metal waste contaminated with hazardous substances
17 04 10 (*)	Cables containing hydrocarbons, tar or other dangerous substances
17 04 11	Cables other than those mentioned in 17 04 10
17 05 03 (*)	Soils and rocks containing hazardous substances
18 01 03	Waste whose collection and disposal is subject to special requirements to avoid infection
18 01 04	Waste whose collection and disposal is not subject to special requirements to prevent infection (e.g. dressings, plasters, bed linen, disposable clothing, diapers)
20 01 01	Paper and cardboard
20 01 21	Fluorescent lamps and other mercury-containing waste
20 02	Garden and park waste
20 03 04	Septic tank sludge

In terms of quantification, for the **solid waste and effluents (fuel and wastewater)** produced during the construction phase, the values shown in the following table were assumed:

Table5 - Estimated category and quantity of solid waste and wastewater to be generated during the construction phase

TYPE / CATEGORY OF WASTE		⁽¹⁾ QUANTITIES PRODUCED (KG)							
SOLID WASTE		Upgrading canals		Research Station Construction Lunda Sul		Upgrading the Research Center Moxico		Upgrading the Research Center Cuando-Cubango	
		DAY	WEEK	DAY	WEEK	DAY	WEEK	DAY	WEEK
Packaging	Plastic bags / tapes								
	Cement bags								
Work front	Demolition debris								
	Soil								
	Vegetation								
	Leftover materials								
	Used water								
	Fuel								
Office	Paper								
	Materials used								
	Waste								
	Wastewater								

⁽¹⁾ Information should be entered when there is an implementation project and more detailed information on sub-projects

Demolition waste and debris that cannot be reused will be transported to the nearest sanitary or controlled landfill.

The plant waste can be reused in a nursery for the trees to be planted in the landscaping project.

Hazardous waste must be placed in separate containers and stored awaiting proper disposal.

The main volumes of waste to be produced correspond to non-hazardous inert waste, most of which has a high potential for material recovery. The risks normally associated with waste management, particularly hazardous waste, will be minimized during the construction phase through the Contractor's implementation of a Waste and Wastewater Management Plan, which will ensure that waste is properly stored and sent to licensed waste management operators.

Cement and rubble can be sent to a crushing plant to be recycled and incorporated as conglomerate during the manufacture of reinforced concrete or used as crushing stone. Likewise, it should be considered as part of the filling material. For backfilling, it must be ensured that this material is first placed in the area to be backfilled to ensure that it is completely covered with earth.

Rubble and reinforced concrete waste should only be sent to Landfill or Controlled Landfill if the above measures are not an option.

7.2 OPERATION PHASE

During the operating phase, waste associated with the operation of the irrigation systems and research centers will be generated:

Table6 - Waste from the operation

CODE	SOLID WASTE
08 01 11 (*)	Waste paints and varnishes containing organic solvents or other dangerous substances
08 01 12 (*)	Waste paint and varnish other than those mentioned in 08 01 11
08 03 18	Waste printing toner other than those mentioned in 08 03 17
15.01 01	Paper and cardboard packaging
15.01 02	Plastic packaging
15.01 03	Wooden packaging
15.01 04	Metal packaging
15.01 05	Composite packaging
15.01 06	Mixed packaging
15.01 07	Glass packaging
15.01 08	Textile packaging
15.02 03	Absorbents, filter materials, cleaning cloths and protective clothing not covered by 15 02 02.
16.01 03	Used tires
16 01 07 (*)	Oil filters
16 01 12	Brake pads other than those specified in 16 01 11
16 01 17	Ferrous metals
16 01 18	Non-ferrous metals
16 01 19	Plastic
16 01 20	Glass
17 01 01	Concrete
17 02 01	Madeira
17 02 02	Glass
17 02 03	Plastic
17 03 02	Bituminous mixtures other than those mentioned in 17 03 01
17 04 07	Mixing metals
17 05 03 (*)	Soils and rocks containing hazardous substances
18 01 03	Waste whose collection and disposal is subject to special requirements to avoid infection
18 01 04	Waste whose collection and disposal is not subject to special requirements to prevent infection (e.g. dressings, plasters, bed linen, disposable clothing, diapers)
20 01 01	Paper and cardboard
20.01 02	Glass
20 01 19	Pesticides
20 01 39	Plastics

CODE	SOLID WASTE
20 02	Garden and park waste
20 03 04	Septic tank sludge
20 03 01	Other municipal and similar waste, including mixed waste

This waste will be managed by the managers of the Irrigation Systems and Research Centers, in accordance with their Waste Management Plan, with an emphasis on the reuse and regeneration of materials.

In the operational phase, the effluents produced come mainly from wastewater and rainwater runoff. This water is collected through the building's wastewater and rainwater drainage systems and sent to a suitable location.

8. SOLID WASTE AND WASTEWATER MANAGEMENT

8.1 CONSTRUCTION PHASE

The Contractor must prepare an RMP detailing specific waste management practices during construction, for approval by the Supervision.

The guidelines for the RMP are presented in the following subsections.

8.1.1 Waste management

Once a waste inventory has been established, the objectives for recovering this waste (minimization, reuse, recycling) must be defined.

Waste transport notes and waste acceptance approvals (or receipts) from the Controlled Landfill closest to the intervention sites or other final destinations must be kept on file in the site office in order to record and prove ongoing compliance for future audits.

8.1.2 Management of waste storage areas

- A specific waste area must be created on the construction site for the storage of all waste streams prior to their removal;
- Signage/color coding should be used to differentiate the storage areas for the various waste streams (i.e. paper, cardboard, metals, food waste, glass, etc.) and should be kept in good condition;
- Hazardous waste must be stored in such a way as to ensure total containment and prevent spillage. For this purpose, a suitable retention basin must be used, with characteristics to ensure that there is no contamination of the soil, surface water or groundwater;
- The location of all temporary waste storage areas should aim to minimize potential impacts on soil, and the prevention of contamination of surface water or groundwater, while also being reasonably located in terms of site centrality and accessibility. Where necessary, additional temporary waste storage areas may be designated, provided that identical controls are exercised for these locations.
- Septic tanks and portable toilets must be checked by the Contractor's environmental specialist (EO) and regularly maintained. The underground storage of septic tanks must withstand the external forces of the surrounding environment. The area above the pit must be demarcated in such a way as to prevent the movement of vehicles or heavy machinery in the surrounding area.
- The waste collection containers placed on the construction site and the septic tanks must be maintained and emptied regularly;
- Inspections and maintenance of the main waste storage area must be carried out regularly;
- Hazardous waste may not be mixed with other types of waste;
- The septic tanks on the site must be kept clean and emptied regularly whenever necessary.

8.1.3 Disposal management

- The waste generated at the shipyard must be removed regularly. This frequency may change during the works, depending on the volumes of waste generated in the different phases of the construction process;
- Solid waste must be removed by a suitably qualified subcontractor or by the Contractor, if he has a permit, and disposed of at the Controlled Landfill closest to the intervention sites or at any other suitable final disposal site. The Contractor must provide proof that the waste has been transported to a suitable disposal site.
- Waste water from the site's septic tanks and from portable toilets on the work fronts must be removed by a qualified subcontractor and proof of transportation must be provided by the Contractor.

8.1.4 Registration

A record of data on solid waste and wastewater is essential for monitoring the RMP. Data recorded on worker training sessions will also provide trends and benchmarks for setting objectives.

Documentation indicating the amount of waste generated and the types of waste must be kept for auditing purposes.

8.2 OPERATION PHASE

The operation phase is expected to result in the production of general waste in garbage cans, laundry, bathrooms, changing rooms, laboratories, workshops and agricultural systems.

During the operating phase, the following waste management principles apply:

- The waste generated must be removed regularly throughout the operating phase and, in the case of septic tanks in laundries, bathrooms and changing rooms, they must be emptied at least once a year.
- Records must be kept of the volumes/mass of the different waste streams collected throughout the life of the project.

It is suggested that a hydrocarbon separator be installed in the system that receives the waste water from the workshops.

As the liquid waste will mainly come from sewage and rainwater, this waste will have to be sent to a suitable location for environmentally appropriate disposal.

9. MONITORING PLAN

9.1 CONSTRUCTION PHASE

The following table shows the monitoring proposed for the construction phase.

Table7 - Monitoring plan for the construction phase.

DESCRIPTION	FREQUENCY	LOCAL	PERFORMANCE INDICATOR	RESPONSIBILITY
Checking waste disposal sites, how waste is segregated, packaged and transported	Diary	Temporary waste disposal sites at the shipyard	Volume of waste produced by type of waste	Contractor
Checking the maintenance of septic tanks and portable toilets	Diary	Septic tanks at the construction site and portable toilets at the work fronts	Volume of waste generated	Contractor
Check the contractor's license	Annually	Shipyard		Contractor
Check waste records	Regularly	Shipyard	Volume and type of waste transported	Contractor

On each job site, the Contractor will designate an employee responsible for the selective collection of waste. The control process involves the monitoring of waste management by the Contractor's OE.

Once a week, the Contractor's EO should check the quantity records for each category of waste produced and collected. This technician should also visit the work fronts, check and control the waste produced, the destination given and to be given to the waste and, finally, review the procedures described in the Waste Management Plan.

9.2 OPERATION PHASE

The following table shows the control proposed for the operation phase.

Table8 - Monitoring plan for the operation phase .

DESCRIPTION	FREQUENCY	LOCAL	PERFORMANCE INDICATOR	RESPONSIBILITY
Proper temporary disposal of waste	Continuously	Irrigation systems and research centers	No destruction/degradation of garbage cans	Local managers
Proper maintenance of septic tanks	Continuously	Research Centers	No infrastructure degradation with cleaning and emptying	managers Water collection company
Proper waste collection and transportation to landfill	Continuously	Irrigation systems and research centers	No residue in the soil	Waste collection company

10. AUDITS AND INSPECTIONS

During the construction phase, the Contractor's EO is responsible for monitoring the management of solid waste and wastewater, and must draw up a Monitoring Plan based on a weekly inspection and a quarterly audit of the waste management procedures on site and on the different work fronts provided



for in the project for the Rehabilitation of Irrigation Systems in Lunda Sul and the upgrading of existing Research Centers (Lunda Sul and Cuando-Cubango) and the construction of a new Research Center (Moxico).

11. REPORT

The EO is responsible for managing the day-to-day implementation of this RMP on site and compiling regular (usually weekly) monitoring reports.

Waste management is part of the Contractor's monthly reporting requirements and must show the types of waste, volumes produced and final treatment.

12. DECOMMISSIONING OF THE SITE

Upon completion of the Project, the area occupied by the Project site shall be cleaned up in a timely manner by the Contractor and its subcontractors, and shall be restored to its original appearance as far as possible in coordination with the surrounding natural environment, reducing and eliminating visual pollution in the surrounding natural landscape.

The structures and equipment installed provisionally will then be decommissioned and dismantled, and the following requirements must be met:

- Remove the construction site fencing, as well as the orange netting and signs installed in some areas of the site, whenever possible and in a way that allows them to be reused. This task will be carried out as late as possible and sequentially in order to maintain the demarcation and signage of the areas still under intervention.
- Deactivate all the networks provisionally installed to serve the central shipyard, namely:
 - Domestic wastewater drainage network;
 - Electricity grid.

With regard to the domestic wastewater system, the pipes must be "flushed" with "clean" water before dismantling and the sludge and wastewater accumulated in the septic tank must, as usual, be removed and taken to a suitable location.

- Define the areas where there are (visually) contamination points in the existing concrete structures, namely the diesel tank basin and the generator basin. Define the volumes of demolished concrete to be treated as hazardous waste (contaminated with hydrocarbons). Define the final destination of hazardous waste (contaminated with hydrocarbons).
- Tour the entire site, warehouses, accesses and work fronts/platforms to check (visually) for areas of contaminated soil (including all platform components other than soil, such as *tout venant*, stone, gravel, etc.), and clean/decontaminate these areas by removing the contaminated materials and sending them to their final destination as hazardous waste (contaminated with hydrocarbons).

The work described must be carried out in the most appropriate sequence and in such a way as to guarantee the greatest efficiency in terms of environmental protection and pollution prevention, taking into account possible interference between the various installations, structures and service networks installed, and taking into account the availability of the equipment required for the work and the deadlines for its execution by the contractors (where applicable).

During the phases of sending waste and wastewater to their final destination, controlling dangerous products and atmospheric and noise emissions, as well as preserving the surrounding areas, the rules established at general level in the Contract will be observed. The same applies to the monitoring of workers during the execution of these specific tasks and the monitoring of the execution of the work itself, which will be checked and all these operations will be duly recorded in order to prove their effectiveness.